BULLETIN

DE LA

SOCIÉTÉ FOUAD Ier D'ENTOMOLOGIE

FONDEE LE 1er AOUT 1907

anciennement:
Société Entomologique d'Egypte (1907-1922)
et ***Société Royale Entomologique d'Egypte*** (1923-1937)

Placée sous le Haut Patronage du Gouvernement Egyptien
par Décret Royal en date du 15 Mai 1923

Année 1940

LE CAIRE
IMPRIMERIE P. BARBEY

1940

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TRENTE-TROISIÈME ANNÉE

VINGT-QUATRIÈME VOLUME

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Les opinions émises dans les publications de la Société sont propres à leurs auteurs. La Société n'en assume aucunement la responsabilité.

Date de parution et de distribution du présent Volume :
31 Décembre 1940

Le Rédacteur en Chef :
A. ALFIERI

DÉCRET DONNANT LE NOM DE
FOUAD PREMIER
A DES INSTITUTIONS PUBLIQUES CRÉÉES SOUS SES AUSPICES [1]

Nous, FAROUK Ier, Roi d'Egypte,

Sur la proposition du Président de Notre Conseil des Ministres tendant à perpétuer le souvenir de feu le Roi Fouad Premier et à glorifier son nom, vu que son règne s'est distingué par des œuvres éminentes dans le domaine des réformes et par la création de maintes institutions publiques dont la réalisation s'est accomplie grâce à ses conseils et à sa sollicitude, ce qui a eu la plus grande influence sur l'orientation et le développement de la renaissance scientifique, littéraire, sociale et économique de l'Egypte;

Sur l'avis conforme de Notre Conseil des Ministres;

DECRETONS

Art. 1. — Le nom de Fouad Premier est donné aux institutions et établissements indiqués au tableau annexé au présent décret. [2]

Art. 2. — Le Président de Notre Conseil des Ministres est chargé de l'exécution du présent décret, qui entrera en vigueur dès sa publication au « Journal Officiel ».

Fait au Palais de Montazah, le 11 Gamad Tani 1357 (7 Août 1938).

FAROUK

Par le Roi :

Le Président du Conseil des Ministres p.i.
ABDEL FATTAH YÉHIA

(*Traduction*)

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(1) Extrait du *Journal Officiel* du Gouvernement Egyptien, N° 94, du Jeudi 11 Août 1938.

(2) Parmi les institutions et établissements indiqués au tableau annexé au présent décret, figure, sub 7 : *Société Fouad Ier d'Entomologie* **au lieu de** *Société Royale Entomologique d'Egypte.*

DÉCRET NOMMANT LE PRÉSIDENT DE LA SOCIÉTÉ FOUAD Ier D'ENTOMOLOGIE (1)

Nous, FAROUK Ier, Roi d'Egypte,

Vu le Décret du 15 Mai 1923 approuvant les Statuts de la Société Royale d'Entomologie d'Egypte (Société Fouad Ier d'Entomologie) ;

Sur la proposition du Président de Notre Conseil des Ministres et l'avis conforme du dit Conseil ;

DECRETONS

Art. 1. — Mahmoud Tewfik Hifnaoui Bey, Ministre de l'Agriculture, est nommé Président de la Société Fouad Ier d'Entomologie.

Art. 2. — Le Président de Notre Conseil des Ministres est chargé de l'exécution du présent décret.

Fait au Palais d'Abdine, le 6 Moharram 1359 (14 Février 1940).

FAROUK

Par le Roi :

Le Président du Conseil des Ministres,

ALY MAHER

(Traduction)

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(1) Extrait du *Journal Officiel* du Gouvernement Egyptien, 67ème année, N° 18, du Lundi 19 Février 1940.

MEMBRES BIENFAITEURS :

1924 M. Moustapha El Salanikli Bey, de Damanhour (Béhéra).

1925 S.E. El Sayed Fathalla Mahmoud Pacha, de Rahmania (Béhéra).

» M. Riad Abdel Kawi El Gebali Bey, de Chebin El Kom (Menoufia).

» S.E. Georges Wissa Pacha, d'Assiout (Haute-Egypte).

» M. Yehia Kawalli Bey, de Minieh (Haute-Egypte).

» M. Yacoub Bibawi Attia Bey, de Minieh (Haute-Egypte).

» S.E. Hassan Charawi Pacha, de Minieh (Haute-Egypte).

» S.E. Habib Chenouda Pacha, d'Assiout (Haute-Egypte).

» M. Mohamed Tewfick Mohanna Bey, de Tewfikieh (Béhéra).

» M. Hassan Ahmed Moussa Bey, de Minieh (Haute-Egypte).

» M. Labib Barsoum Hanna Bey, de Minieh (Haute-Egypte).

» S.E. Hassan Mohamed El Tahtawi Pacha, de Guirgheh (Haute-Egypte).

» M. Kassem Osman El Labban Bey, de Guirgheh (Haute-Egypte).

» M. Dordeir El Sayed Ahmed El Ansari Bey, de Guirgheh (Haute-Egypte).

» M. Barsoum Said Abdel Messih Bey, de Minieh (Haute-Egypte).

» M. Dordeir Taha Abou Gounema Bey, de Minieh (Haute-Egypte).

1926 M. Mohamed Rifaat El Roznamgy Bey.

1927 M. le Dr. Walter Innes Bey, †.

» M. le Dr. Avocat Giovanni Ferrante, du Caire.

1928 M. Hassan C. Efflatoun Bey, du Caire.

» M. Hugo Lindeman, †.

1932 M. Alfred Reinhart, †.

Membres du Conseil de la Société FOUAD Ier d'Entomologie en 1940 :

M. le Prof. Mahmoud Tewfik Hifnaoui Bey, *Président.*

M. le Prof. Dr. H. Priesner, *Vice-Président.*

M. le Prof. Hassan C. Efflatoun Bey, *Vice-Président.*

M. Anastase Alfieri, *Secrétaire-Général.*

M. Richard Wilkinson, *Trésorier.*

S.E. Fouad Abaza Pacha.

M. le Dr. Mohamed Shafik.

M. le Dr. Kamel Mansour.

M. Abdel Megid El Mistikawy.

M. le Dr. Hamed Seleem Soliman.

M. le Dr. Saadallah Mohamed Madwar.

M. Mohamed Soliman El Zoheiri.

Comité Scientifique :

M. le Prof. Dr. H. Priesner, M. le Prof. Hassan C. Efflatoun Bey, M. le Dr. Kamel Mansour, M. le Dr. Mohamed Shafik, M. le Dr. Hamed Seleem Soliman, M. le Dr. Saadallah Mohamed Madwar ; M. Mohamed Soliman El Zoheiri, M. Anastase Alfieri.

Censeurs :

M. le Dr. A. Azadian et M. E. Kaourk.

LISTE DES MEMBRES

DE LA

SOCIETE FOUAD Ier D'ENTOMOLOGIE

EN 1940

(Les noms des Membres Fondateurs sont précédés de la lettre F)

Vice-Président Honoraire

F FERRANTE (Dr. Avocat Giovanni), 14, Rue El Nemr, au Caire.

Membres Honoraires

1908 ALLUAUD (Charles), Les Ouches, à Crozant (Creuse), France.

1924 EBNER (Prof. Richard), 3, Beethovengasse, Vienne IX, Allemagne.

1909 MARCHAL (Dr. Paul), 45, Rue de Verrières, à Antony (Seine), France.

1929 PARENT (l'Abbé O.), Institution Ste Marie, Aire sur la Lys, Pas de Calais, France.

» PEYERIMHOFF DE FONTENELLE (P. de), 87, Boulevard Saint-Saëns, Alger, Algérie.

1908 PIC (Maurice), 3, Rue du Pont Neuf, à Digoin (Saône et Loire), France.

1921 PIERRE (Claude), 7 bis, Rue du Loing, Paris (XIVe), France.

1936 SEIF EL-NASR Pacha (S.E. AHMED HAMDI), Rue Khosro Pacha, Helouan, près le Caire.

1940 SILVESTRI (Prof. F.), Ecole Royale Supérieure d'Agriculture, Portici (Naples), Italie.

1929 Théry (André), Laboratoire d'Entomologie, Museum National d'Histoire Naturelle, 45 bis, Rue de Buffon, Paris (Ve), France.

1920 Tonnoir (André), Senior Research Officer, Division of Economic Entomology, Council for Scientific and Industrial Research, P.O. Box 109, Canberra, F.C.T., Australia.

» Villeneuve (Dr. Joseph), Rue Président Paul Doumer, Rambouillet (Seine et Oise), France.

F Willcocks (F.C.), « Brambles », Hurst Lane, Sedlescombe (near Battle), Sussex, Angleterre.

Membres Correspondants

1932 Alfken (J.D.), 18, Delmestrasse, Brême, Allemagne.

» Ballard (Edward), District Commissioner's Office, Jerusalem, Palestine.

1924 Cros (Dr. Auguste), 6, Rue Dublineau, Mascara, Algérie.

1928 D'Orchymont (A.), 176, Avenue Houba de Strooper, Bruxelles (II), Belgique.

1924 Flower (Major Stanley Smyth), Tring, Herts, Angleterre.

1934 Gadeau de Kerville (Henri), 7, Rue du Passage Dupont, Rouen, France.

1926 Hall (Dr. W.J.), Superintendent of the Mazoe Estate and Experimental Station, B.S.A. Company Citrus Estate, Mazoe, Southern Rhodesia, South Africa.

1923 Hervé-Bazin (Prof. Dr. J.), Le Patys, par Segré (Maine et Loire), France.

1924 Hindle (Dr. Prof. Edouard), Magdelene College, Cambridge, Angleterre.

1923 Hustache (A.), Pensionnat St. Laurent, à Lagny (Seine et Marne), France.

1925 Kirkpatrick (Thomas Winfrid), East African Agricultural Research Station, Section of Entomology, Amani (via Tanga), Tanganyika Territory, British East Africa.

1934 Koch (C.), c/o Monsieur Georges Frey, 18, Pienzenauerstrasse, Munich 27, Allemagne.

1929 Masi (L.), Museo Civico di Storia Naturale « Giacomo Doria », 9, Via Brigata Liguria, Genova (102), Italie.

1930 Mellor (J.E.M.), The Prospect Cottage, Bredwardine, Herefordshire, Angleterre.

1934 Paoli (Prof. Guido), Directeur du R. Osservatorio per le Malatie delle Piante, 1, Via Marcello Durazzo, Gênes, Italie.

» Schatzmayr (A.), Museo Civico di Storia Naturale, Corso Venezia, Milano, Italie.

1927 Williams (C.B.), Rothamsted Experimental Station, Harpenden, Herts, Angleterre.

Membres Titulaires

1913 Abaza Pacha (S.E. Fouad), Boîte Postale N° 63, au Caire.

1933 Abdel Malek (Ragheb), Section d'Entomologie, Musée Agricole Fouad Ier, Dokki (Ghizeh), près le Caire.

1923 Agriculture and Forests Department (The Director), Khartoum, Soudan.

1908 Alfieri (Anastase), Secrétaire Général et Conservateur de la Société Fouad Ier d'Entomologie, Boîte Postale N° 430, au Caire.

1938 Attia (Rizk), Section d'Entomologie, Ministère de l'Agriculture, Dokki (Ghizeh), près le Caire.

1924 Azadian (Dr. A.), Laboratoires d'Hygiène Publique, au Caire.

1938 Bailey Bros and Swinfen Ltd., Cathedral House, 8-11, Paternoster Row, Londres, E.C. 4, Angleterre.

1939 Bechir (Mahmoud), Section de Protection des Plantes, Ministère de l'Agriculture, Dokki (Ghizeh), près le Caire.

1929 Bichara (Ibrahim), Section d'Entomologie, Ministère de l'Agriculture, Dokki (Ghizeh), près le Caire.

1937 Biggs (H.E.), 12, Tera El Boulaquieh, au Caire.

1938 BLANCHETEAU (Marcel), Aux Amateurs de Livres, 56, Faubourg Saint-Honoré, Paris (VIIIe).

1939 BLARINGHEM (Louis), de l'Institut de France, Conservateur de l'Arboretum G. Allard, 77, Rue des Saints Pères, Paris (VIe), France.

1923 BODENHEIMER (Prof. F.S.), Merkez Ziraat Mucadele Enstitusu. Ankara, Turquie.

1933 CALZOLARI (Emilio), Ingénieur Agronome, 28, Rue Chérif Pacha, Alexandrie.

1938 CARNERI (Alexandre), Librairie Elpénor, 10, Rue Chakour Pacha, Alexandrie.

1929 CASSAB (Antoine), Section d'Entomologie, Ministère de l'Agriculture, Dokki (Ghizeh), près le Caire.

F CHAKOUR (Edgard), Secrétaire Général de la Société Anonyme des Eaux du Caire, Rue Foum El-Teraa El-Boulakia, au Caire.

1931 COMPAGNIE UNIVERSELLE DU CANAL MARITIME DE SUEZ, Kasr el Doubara, au Caire.

1934 CRÉDIT FONCIER EGYPTIEN (Monsieur l'Administrateur Délégué), Rue Malika Farida, au Caire.

1938 DESSOUKI (Mohamed Soliman), Section d'Entomologie, Ministère de l'Agriculture, Dokki (Ghizeh), près le Caire.

» DIRECTORATE OF AGRICULTURE, Ministry of Economics and Communications, Baghdad, Irak.

1928 DOLLFUS (Robert Ph.), Museum National d'Histoire Naturelle, 57, Rue Cuvier, Paris (Vme), France.

1919 EFFLATOUN Bey (Hassan C.), Professeur d'Entomologie et Vice-Doyen de la Faculté des Sciences, Université Fouad Ier, Abbassieh, au Caire.

1934 FACULTÉ D'AGRICULTURE, Université Fouad Ier, Ghizeh, près le Caire.

1940 FARGHAL ALY (Mohamed), 35, Rue Akef, Abbassia, au Caire.

1914 GARBOUA (Maurice), 1, Rue Soliman Pacha, au Caire.

1938 GHABN (Dr. Abdel Aziz), Section d'Entomologie, Ministère de l'Agriculture, Dokki (Ghizeh), près le Caire.

1927 GHALI Pacha (S.E. Wacef Boutros), Avenue de Ghizeh, près le Caire.

1938 GHESQUIÈRE (J.), 87, Avenue du Castel, Bruxelles (W. St L.), Belgique.

1935 GLYKI (Marc), Ingénieur-Chimiste, Bureau Technique Agricole et Industriel, 2, Rue du Télégraphe Anglais, Alexandrie.

1921 GREISS (Elhamy), Département Botanique, Faculté des Sciences, Université Fouad Ier, Abbassieh au Caire.

1936 HAFEZ (Dr. MAHMOUD), Ph. D., Département d'Entomologie, Faculé des Sciences, Université Fouad Ier, Abbassieh, au Caire.

1938 HAMZA (Soliman), Section d'Entomologie, Ministère de l'Agriculture, Dokki (Ghizeh), près le Caire.

1930 HANAFY Bey (Mahmoud), 12, Rue Akhshid, Manial El Roda, près le Caire.

1938 HANNA (Dr. Assaad Daoud), Section d'Entomologie, Ministère de l'Agriculture, Dokki (Ghizeh), près le Caire.

1928 HASSAN (Dr. Ahmed Salem), Professeur de Zoologie et d'Entomologie à la Faculté d'Agriculture, Université Fouad Ier, Ghizeh, près le Caire.

1940 HIFNAOUI Bey (Prof. Mahmoud Tewfik), Professeur de Botanique et Doyen de la Faculté d'Agriculture, Université Fouad Ier, Président de la Société Fouad Ier d'Entomologie, Rue El-Madares, Ghizeh, près le Caire.

1932 HIS MAJESTY STATIONERY OFFICE, Princes Street, Westminster, S.W.1, London, Angleterre.

1925 HOCHEIRY Bey (Abd-El-Baki Zaki El), ancien Conseiller à la Cour d'Appel Indigène, 22, Rue Abou el Feda, Zamalek, au Caire.

1924 HONORÉ (A.), Chimiste, Raffinerie de Hawamdieh, Haute-Egypte.

1927 HOUSNY (Mahmoud), Section d'Entomologie, Ministère de l'Agriculture, Dokki (Ghizeh), près le Caire.

1938 IBRAHIM (Abdel Hamid), Section d'Entomologie, Ministère de l'Agriculture, Dokki (Ghizeh), près le Caire.

1940 Ibrahim (Ahmed Housny), Section d'Entomologie, Ministère de l'Agriculture, Dokki (Gkizeh), près le Caire.

1936 Imperial Chemical Industries (Egypt) S.A., 26. Rue Madabegh, au Caire.

1938 Itribi (Abbas El), Section d'Entomologie, Ministère de l'Agriculture, Dokki (Ghizeh), près le Caire.

1928 Izzet Bey (Mohamed), 14, Midan el Daher, au Caire.

1915 Jullien (Joseph), 248, Rue de Thèbes, Cleopâtra les Bains, par Sidi-Gaber, Ramleh.

1927 Kamal (Dr. Mohamed), Cotton Research Board, Ministère de l'Agriculture, Ghizeh, près le Caire.

1922 Kaourk (Elias A.), Avocat, 35, Rue Kasr el Nil, au Caire.

1926 Kassem (Mohamed), Section d'Entomologie, Ministère de l'Agriculture, Dokki (Ghizeh), près le Caire.

1938 Klein (Henry Z.), Agricultural Research Station, Rehovoth, Palestine.

1923 Laboratoires d'Hygiène Publique, Bibliothèque de la Section d'Helminthologie, au Caire.

1931 Land Bank of Egypt (Mons. l'Administrateur-Directeur de la), Boîte Postale N° 614, Alexandrie.

1934 Lotte (Dr. F.), Médecin de la Compagnie Universelle du Canal Maritime de Suez, Boîte Postale N° 222, Port-Saïd.

1937 Loutfy (Abdel Aziz), Section de la Protection des Plantes, Ministère de l'Agriculture, Dokki (Ghizeh), près le Caire.

1931 Lycées Français, 2-4, Rue Haouayati, au Caire.

1932 Madwar (Dr. Saadallah Mohamed), Fouad Ist Institute and Hospital for Tropical Diseases, 10, Rue Kasr El Aini, au Caire.

» Maluf (Dr. N. S. Rustum), Department of Zoology, The Johns Hopkins University, Charles and 34th Streets, Baltimore, Maryland, Etats-Unis d'Amérique.

1927 Mansour (Prof. Dr. Kamel), D. Sc., Département de Zoologie, Faculté des Sciences, Université Fouad Ier, Abbassieh, au Caire.

1921 Mistikawy (Abdel Megid El), Sous-Directeur de la Section de la Protection des Plantes, Ministère de l'Agriculture, Dokki (Ghizeh), près le Caire.

1933 Mochi (Dr. Alberto), 119, Avenue Malika Nazli, au Caire.

1940 Mohamed (Ibrahim Nour El Din), B. Sc. (Faculté d'Agriculture, Université Fouad Ier), 5, Rue Afrah El Anghal, Mounira, au Caire.

1929 Mosseri (Henri), 25, Rue Cheikh Abou El Sebaa, au Caire.

1940 Nour El Din (Ahmed), Section d'Entomologie, Ministère de l'Agriculture, Dokki (Ghizeh), près le Caire.

1939 Pantos (Jean), Ingénieur Agronome, Abou Kerkas, Haute-Egypte.

1911 Petroff (Alexandre), 27, Rue Grafton, Bulkeley, Ramleh.

1928 Priesner (Prof. Dr. H.), Directeur de la Section d'Entomologie, Ministère de l'Agriculture, Dokki (Ghizeh), près le Caire.

1932 Rivnay (E.), Agricultural Research Station, Rehovoth, Palestine.

1925 Royal Entomological Society of London (The), 41, Queen's Gate, South Kensington, S.W. 7, Londres, Angleterre.

1938 Runkewitz (G.), Savoy Hotel, Louxor, Haute Egypte.

1936 Sayed (Dr. Mohamed Taher), Section d'Entomologie, Ministère de l'Agriculture, Dokki (Ghizeh), près le Caire.

1938 Shafei (Mohamed Aly Ismail El), 18, Midan Mohamed Aly, au Caire.

» Shafik (Dr. Mohamed), Directeur Technique de la Société Financière et Industrielle d'Egypte, Boîte Postale N° 7, Kafr Zayat, Basse Egypte.

1924 Shaw (Fred), Northgate, Sherborne, Dorset, Angleterre.

1938 Société du Naphte S.A. (A.I. Mantacheff & Co.), 1, Rue de l'Eglise Debbané, Alexandrie.

1921 Société Royale d'Agriculture, Laboratoire d'Entomologie de la Section Technique, Boîte Postale N° 63, au Caire.

1934 Soliman (Dr. Hamed Seleem), Faculté d'Agriculture, Université Fouad Ier, Ghizeh, près le Caire.

1928 Soliman (Dr. Labib Boutros), Section d'Entomologie, Ministère de l'Agriculture, Dokki (Ghizeh), près le Caire.

1933 Taihoku Imperial University Library (The), Taihoku, Formosa, Japon.

1926 Tewfik (Mohamed), Assistant Entomologiste, Faculté des Sciences, Université Fouad Ier, Abbassieh, au Caire.

1935 Tractor Company of Egypt, S.A.E. (The), 140, Rue Emad El Dine, Boîte Postale N° 366, au Caire.

1926 Waly (Dr. Mohamed), Conférencier en Zoologie, Faculté des Sciences, Université Fouad Ier, Abbassieh, au Caire.

1912 Wilkinson (Richard), Immeuble Baehler, 157, Avenue Fouad Ier, Zamalek, au Caire.

1940 Zaki (Michel), Section d'Entomologie, Ministère de l'Agriculture, Dokki (Ghizeh), près le Caire.

1938 Zoheiry (Mohamed Soliman El), Sous-Directeur et Directeur p.i. de la Section d'Entomologie, Ministère de l'Agriculture, Dokki (Ghizeh), près le Caire.

1926 Zulficar Bey (Samir), 8, Rue Mohamed Mazhar Pacha, Zamalek, au Caire.

Institutions Scientifiques et Bibliothèques

Afrique Occidentale Française:

Institut Français d'Afrique Noire, Boîte Postale N° 206, Dakar.

Afrique du Sud:

South African Museum, P.O. Box 61, Cape Town.

Department of Agriculture of the Union of South Africa (The Agricultural Journal of the Union of South Africa), Pretoria.

Department of Agriculture of the Union of South Africa, Division of Entomology, P.O. Box 513, Pretoria.

The Director, The Transvaal Museum, P.O. Box 413, Pretoria, South Africa.

The Honorary Secretary, Entomological Society of Southern Africa, P.O. Box 103, Pretoria.

Algérie:

Société d'Histoire Naturelle de l'Afrique du Nord, Faculté des Sciences d'Alger, Alger.

Allemagne:

Deutsche Entomologische Gesellschaft, 43, Invalidenstrasse, Berlin (IV).

Senckenbergischen Naturforschenden Gesellschaft, Bibliothek, Viktoria Allee 9, Frankfurt A/M.

Bücherei des Zoologischen Museums, 43, Invalidenstrasse, Berlin N 4.

Gesellschaft für Vorratsschutz E.V. (Mitteilungen der), 31, Zimmermannstrasse, Berlin-Steglitz.

Bücherei der Biologischen Reichsanstalt für Land- und Forstwirtschaft. 19, Königin-Luise-Str., Berlin-Dahlem.

Deutsches Entomologisches Institut der Kaiser Wilhelm Gesellschaft (Arbeiten über morphologische und taxonomische Entomologie, Arbeiten über physiologische und angewandte Entomologie), 20, Gossler Strasse, Berlin-Dahlem.

Deutsche Kolonial und Uebersee-Museum, Bahnhofsplatz, Brême.

Administration-Kanzlei des Naturhistorischen Museums, Burgring 7, Vienne (I).

Zoologisch-Botanische Gesellschaft, 2, Mechelgasse, Vienne (III).

Koleopterologische Rundschau, c/o Zoologisch-Botanische Gesellschaft, 2, Mechelgasse, Vienne (III).

Naturhistorischer Verein der Rheinlande und Westfalens (Entomologische Blätter, Decheniana), 4, Maarflach, Bonn.

Münchner Entomologischen Gesellschaft E.V. (Mitteilungen der), c/o Dr. W. Forster, 51, Neuhauser Strasse (Zoolog. Staatssamlg.), Munich (2).

Angleterre:

The Imperial Institute of Entomology, Review of Applied Entomology, 41, Queen's Gate, London S.W. 7.

Zoological Museum (Novitates Zoologicæ), Tring Park, Tring, Herts.

The Apis Club (The Bee World), The Way's End, Foxton, Royston, Herts.

Cambridge Philosophical Society, New Museums, Free School Lane, Cambridge.

The Librarian, The Zoological Society of London, Zoological Gardens, Regent's Park, London, N.W.8.

The Librarian, Department of Entomology, University Museum, Oxford.

Argentine:

Instituto Biologico de la Sociedad Rural Argentina, Buenos Aires.

Sociedad Cientifica Argentina, 1145, Calle Santa Fé, Buenos Aires.

Sociedad Entomologica Argentina, 665, Calle San Martin, Buenos Aires.

Museo Nacional de Historia Natural « Bernadino Rivadavia », Casilla de Correo N° 470, Buenos Aires.

Ministerio de Agricultura (Boletin del Ministerio de Agricultura de la Nacion), Bibliotheca, 974, Paseo Colon, Buenos Aires.

Australie:

The Australian Museum (Records of the Australian Museum), Sydney, N.S.W.

The Entomologist's Office, Department of Agriculture, Sydney, N.S.W.

The Public Library, Museum, and Art Gallery of South Australia, Box 386 A, G.P.O., Adelaide, South Australia.

The Library of the Division of Economic Entomology, P.O. Box No. 109, Canberra City, F.C.T.

The Linnean Society of New South Wales, Science House, Gloucester and Essex Streets, Sydney, N.S.W.

Belgique:

Société Entomologique de Belgique, Musée Royal d'Histoire Naturelle de Belgique, 31, Rue Vautier, Ixelles-Bruxelles.

Société Scientifique de Bruxelles, Secrétariat, 11, Rue des Récollets. Louvain.

Monsieur A. Moureau, Secrétaire du Bulletin de l'Institut Agronomique et des Stations de Recherches de Gembloux, Institut Agronomique de l'Etat, Gembloux.

Lambillionea, Revue Mensuelle de l'Union des Entomologistes Belges (M. F. Derenne), 123, Avenue de la Couronne, Ixelles (Bruxelles).

Annales du Musée du Congo Belge, Tervueren.

Association des Ingénieurs sortis de l'Institut Agronomique de l'Etat, à Gembloux, 35, Avenue des Volontaires, Anderghem-Bruxelles.

Brésil:

Museu National do Rio de Janeiro, Rio de Janeiro.

Instituto Biologico, Bibliotheca, Caixa Postal 2821, Sâo Paulo.

Instituto Oswaldo Cruz, Caixa de Correio 926, Rio de Janeiro.

Arquivos do Serviço Florestal, 1008, Jardim Botânico, Rio de Janeiro.

Bulgarie:

Institutions Royales d'Histoire Naturelle, Musée Royal d'Histoire Naturelle, Palais Royal, Sofia.

Société Entomologique de Bulgarie, Musée Royal d'Histoire Naturelle, Palais Royal, Sofia.

Société Bulgare des Sciences Naturelles, Musée Royal d'Histoire Naturelle, Palais Royal, Sofia.

Canada :

Entomological Society of Ontario (The Canadian Entomologist & Reports), Guelph, Ontario.

Bibliothèque du Ministère Fédéral de l'Agriculture, Edifice de la Confédération, Ottawa.

Department of Agriculture, Entomological Branch, Ottawa.

Nova Scotian Institute of Science, Halifax.

Chine :

The Lingnan Science Journal, Lingnan University, Canton.

Bulletin of the Biological Department, Science College, National Sun Yat-Sen University, Canton.

Bureau of Entomology of the Chekiang Province, West Lake, Hangchow.

Chypre :

The Cyprus Agricultural Journal (The Office of the Governement Entomologist), Nicosia.

Colombie (République de), Amérique du Sud :

Revista Facultad Nacional de Agronomia, Biblioteca Facultad Nacional de Agronomia, Universitad Nacional, Medellin.

Cuba :

Sociedad Cubana de Historia Natural « Felipe Poey » (Memorias), c/o Dr. Carlos Guillermo Agnayo, 25 N° 254, Vedado, La Havane.

Danemark :

Entomologisk Forening, Zoologisk Museum, Krystalgade, Copenhague.

Egypte :

Bibliothèque du Cabinet de S.M. le Roi, Palais d'Abdine, au Caire.

Bibliothèque privée de S.M. le Roi, Palais d'Abdine, au Caire.

Ministère de l'Agriculture, Bibliothèque de la Section d'Entomologie, Dokki (Ghizeh), près le Caire.

Société Royale d'Agriculture, Bibliothèque de la Section Technique, Boîte Postale N° 63, au Caire.

Union des Agriculteurs d'Egypte, 25, Rue Cheikh Abou El Sebaa, au Caire.

The Bee Kingdom, 60, Rue Menasce, Alexandrie.

Al-Fellaha, Boîte Postale N° 2047, au Caire.

Société Royale de Géographie d'Egypte, 45, Rue Cheikh Youssef, au Caire.

Bibliothèque du Ministère de l'Instruction Publique, Rue El Falaki, au Caire.

The Journal of the Egyptian Medical Association, Kasr El Aini Post Office, au Caire.

Société Fouad I^er d'Economie Politique, de Statistique et de Législation, Boîte Postale N° 732, au Caire.

Institut d'Egypte, Rue Sultan Hussein (ex Rue El Cheikh Rihan), au Caire.

Bibliothèque Egyptienne, Midan Bab El Khalq, au Caire.

Bibliothèque du Musée Agricole Fouad I^er, Dokki (Ghizeh), près le Caire.

Bibliothèque de la Faculté de Médecine, Université Fouad I^er, Rue Kasr El Aini, au Caire.

Bibliothèque de la Faculté des Sciences, Université Fouad I^er, Abbassieh, au Caire.

Equateur (République de l'), Amérique du Sud:

Director General de Agricultura (Revista del Departamento de Agricultura), Quito.

Boletin de la Seccion Agricola del Banco Hipotecario del Ecuador, Apartado 685, Quito.

Espagne:

Instituto Nacional de 2ª Ensenanza de Valencia, Laboratorio de Hidrobiologia Espanola, Valencia.

Junta para ampliacion de Estudios e Investigaciones Cientificas, 4, Duque de Medinaceli, Madrid.

Junta de Ciencies Naturales de Barcelona, Museo Municipal, Barcelona.

Real Academia de Ciencias y Artes de Barcelona, 9, Rambla de los Estudios, Barcelona.

Sociedad Espanola de Historia Natural, Museo Nacional de Ciencias Naturales, Hipodromo, Madrid (VI).

Estacion de Patologia Vegetal, Instituto Nacional Agronomico, La Monclea, Madrid (VIII).

Etats-Unis:

The Research Library, Buffalo Socicety of Natural Sciences, Buffalo Museum of Science, Humboldt Park, Buffalo, New-York.

University of Illinois Library, Exchange Division, Urbana, Illinois.

Library of the American Museum of Natural History, Central Park, West at 79th Street, New-York City.

Pacific Coast Entomological Society (The Pan-Pacific Entomologist), California Academy of Sciences, Golden Gate Park, San Francisco, California.

Academy of Natural Sciences, Entomological Section, Lagon Square, Philadelphia.

Experiment Station of the Hawaiian Sugar Planters' Association, P.O. Box 411, Honolulu, T.H., Hawai.

Hawaiian Entomological Society, c/o Experiment Station of the Hawaiian Sugar Planters' Association, P.O. Box 411, Honolulu, T.H., Hawai.

Carnegie Museum, Department of the Carnegie Institute, Pittsburgh, Pennsylvania.

American Entomological Society, Academy of Natural Sciences, Logan Square, Philadelphia, Pa.

United States Department of Agriculture, Washington, D.C.

General Library, University of Michigan, Ann Arbor, Michigan.

United States National Museum, Smithsonian Institution, Washington, D.C.

Smithsonian Institution Library, Washington, D.C.

Library of the New-York State College of Agriculture and Agricultural Experiment Station, Cornell University, Ithaca, New-York.

New-York Academy of Sciences, New-York.

Pennsylvania State Health Department, Pennsylvania.

University of California Library, Berkeley, California.

University of California, Citrus Experimental Station Library, Riverside, California.

Wisconsin Academy of Sciences, Arts, and Letters, Madison, Wisconsin.

Library, Minnesota Agricultural Experiment Station, University Farm, Saint Paul, Minnesota.

Museum of Comparative Zoology, Harward College, Cambridge, Mass.

The Philippine Agriculturist, Library, College of Agriculture, Agricultural College, Laguna, Philippine Islands.

Editorial Office, The American Midland Naturalist, University of Notre Dame, Notre Dame, Indiana.

Marine Biological Laboratory, Library, Woods Hole, Mass.

Finlande:

Societas Entomologica Helsingforsiensis, Helsinki.

Societas pro Fauna et Flora Fennica, Kaserngatan 24, Helsinki.

Societas Zoologica-Botanica Fennica Vanamo, Säätytalo, Snellmanstr. 9-11, Helsinki.

Société Entomologique de Finlande (Annales Entomologici Fennici), Institut de Zoologie Agricole et Forestière de l'Université, Snellmaninkatu 5, Helsinki.

France:

L'Echange, Revue Linnéenne, Digoin (Saône et Loire).

Revue française d'Entomologie, Museum National d'Histoire Naturelle (Entomologie), 45 bis, Rue de Buffon, Paris (V^e).

Revue Scientifique du Bourbonnais et du Centre de la France, 22, Avenue Meunier, Moulins (Allier).

Société d'Etudes des Sciences Naturelles de Nîmes, 6, Quai de la Fontaine, Nîmes (Gard).

Société de Pathologie Végétale et d'Entomologie Agricole de France, Laboratoire de Pathologie Végétale, Institut National Agronomique, 16, Rue Claude Bernard, Paris (V^e).

Société Linnéenne de Bordeaux, Athénée, 53, Rue Des Trois Conils, Bordeaux.

Société Linéenne de Lyon, 33, Rue Bossuet (Imm. Municipal), Lyon.

Société des Sciences Naturelles de l'Ouest de la France, Nantes (Loire Inférieure).

Association des Naturalistes de Levallois-Perret, 153, Rue du Président Wilson (Domaine de la Planchette), Levallois-Perret (Seine).

Société Linnéenne du Nord de la France, 81, Rue Lemerchier (M. Pauchet), Amiens.

Société Géologique de Normandie et des Amis du Museum du Havre, Hôtel des Société Savantes, 56, Rue Anatole France, Le Havre (Seine Inférieure).

Société d'Histoire Naturelle de Toulouse, Bibliothèque Universitaire de la Faculté de Médecine, Allée Saint-Michel, Toulouse.

Société Entomologique de France, Institut National Agronomique, 16, Rue Claude Bernard, Paris (Ve).

Société d'Etudes Scientifiques de l'Aude, Carcassone (Aude).

Annales des Epiphyties et de Phytogénétique, Centre National des Recherches agronomiques, à Versailles, France.

Museum National d'Histoire Naturelle, Bibliothèque, 8, Rue de Buffon, Paris (Ve).

Société de Zoologie Agricole (Revue de Zoologie Agricole et Appliquée), Faculté des Sciences, Institut de Zoologie, 40, Rue Lamartine, Talence (Gironde).

Grèce:

Institut Phytopathologique Benaki, Kiphissia (près Athènes).

Bibliothèque de l'Institut et Musée Zoologique de l'Université, Athènes.

Hollande:

Bibliotheek van der Nederlandsche Entomologische Vereeniging, p/a Bibliotheek van het Kolonial Instituut, 62, Mauritskade, Amsterdam.

Landbouwhoegeschool Laboratorium voor Entomologie, Berg 37, Wageningen.

Hongrie:

Museum National Hongrois (Annales Historico-Naturales), 13, Barossutca, Budapest VIII.

Indes :

Zoological Survey of India (Records of the Indian Museum), Indian Museum, Calcutta.

Madras Governement Museum, Connemara Public Library, Egmore, Madras.

Office of the Director, Imperial Agricultural Research Institute, New Delhi.

Indes Néerlandaises :

Bibliotheek van het Departement van Economische Zaken, Groote Weg 20, Buitenzorg, Java.

Italie :

Museo Civico di Storia Naturale « Giacomo Doria », 9, Via Brigata Liguria, Genova (102).

Rivista di Biologia Coloniale, 326, Viale Regina Margherita (Policlinico), Roma.

Museo Civico di Storia Naturale di Trieste (Atti del), 4, Piazza Hortis, Trieste (10).

Società dei Naturalisti in Napoli, Reale Università, Via Mezzocannone, Napoli.

Società Entomologica Italiana, Museo Civico di Storia Naturale, 9, Via Brigata Liguria, Genova (102).

Società Adriatica di Scienze Naturali, 7, Via dell'Annunziata, Trieste.

La Reale Stazione di Entomologia Agraria (Redia), 19, Via Romana, Firenze (32).

La Reale Stazione Sperimentale di Gelsicoltura e Bachicoltura di Ascoli Piceno.

Istituto Zoologico della Reale Università di Napoli (Biblioteca del), Via Mezzocannone, Napoli.

Laboratorio di Zoologia Generale e Agraria del Reale Istituto Superiore Agrario in Portici, Portici (Napoli).

Reale Laboratorio di Entomologia Agraria di Portici (Bolletino del), Portici (Napoli).

Bibliothèque de l'Institut International d'Agriculture (Moniteur International de la Protection des Plantes), Villa Umberto I, Rome (110).

Società italiana di Scienze Naturali, Palazzo del Museo Civico di Storia Naturale, Corso Venezia, Milano.

Istituto di Zoologia della Reale Università di Genova (Bollettino dei Musei di Zoologia e di Anatomia comparata), 5, Via Balbi, Genova.

Società dei Naturalisti e Matematici di Modena, presso la Reale Università, Modena.

Istituto di Entomologia della Reale Università, 6, Via Filippo Re, Bologna (125).

Reale Accademia di Scienze, Lettere ed Arti in Padova, 15, Via Accademia, Padova (Veneto).

Museo di Storia Naturale della Venezia Tridentina («Memorie del Museo di Storia Naturale della Venezia Tridentina» e «Studi Trentini di Scienze Naturali»), Casella Postale 95, Trento.

Reale Istituto Agronomico per l'Africa Italiana (L'Agricoltura Coloniale), Ministero dell'Africa Italiana, 9, Viale Principe Umberto, Firenze.

Istituto di Entomologia Agraria e Bachicoltura della Reale Università (Bolletino di Zoologia Agraria e Bachicoltura), 2, Via Celoria, Milano (133).

Società Veneziana di Storia Naturale (presso Sig. Antonio Giordani Soika), S. Marco 254, Venezia.

Japon:

Saghalien Central Experiment Station, Konuma, Saghalien.

The Ohara Institute for Agricultural Research, Library, Kurashiki, Okayama-Ken.

Imperial Agricultural Experiment Station (Journal of the), Nishigahara, Tokyo.

Departement of Agriculture, Government Research Institute, Taihoku, Formosa.

The Kansai Entomological Society, c/o N. Tosawa, Shibakawa-Noen, Kotoen, Mukogun, Hyogo-ken.

« Mushii », Entomological Laboratory, Department of Agriculture, Kyushu Imperial University, Fukuoka.

Takeuchi Entomological Laboratory (Tenthredo, Acta Entomologica), Shinomyia Yamashina, Kyoto.

Kenya:

East Africa and Uganda Natural History Society, Coryndon Memorial Museum, P.O.Box 658, Nairobi, Kenya Colony, British East Africa.

Libye :

Museo Libico di Storia Naturale, Piazza Santa Maria degli Angeli, Tripoli d'Africa.

Maroc:

Société des Sciences Naturelles du Maroc, Institut Scientifique Chérifien, Avenue Biarnay, Rabat.

Défense des Végétaux, Service de l'Agriculture et de la Colonisation, Direction des Affaires Economiques, Rabat.

Mexique:

Junta Nacional Directora de la Campana contra la Langosta (Junosta), Biblioteca, Departamento Directivo, Veracruz.

Biblioteca del Instituto Biotecnico, Calzada Mexico-Tacuba N° 295, Col. Anahuac, D.F.

Biblioteca del Instituto de Biologia, Chapultepec (Casa del Lago), Mexico, D.F.

Anales de la Escuela Nacional de Ciencias Biologicas, Apartado Postal 7016, Mexico, D.F.

Norvège :

Tromso Museum Library, Tromso.

Panama (République de):

Departamento Seccional de Agricultura (Boletin Agricola), Panama.

Pologne:

Musée Zoologique Polonais, Wilcza 64, Varsovie (1).

Société Polonaise des Entomologistes, Rutowskiego 18, Lwow.

Institut de Recherches des Forêts de l'Etat, Wawelska 54, Varsovie.

Portugal:

Société Portugaise des Sciences Naturelles, Instituto de Fisiologia, Faculdade de Medicina, Lisbonne.

Museum Zoologique de l'Université de Coimbra, Largo Marquês de Plombal, Coimbra.

Associçao da Filosofia Natural, na Faculdade de Ciencias, Porto.

Roumanie:

Société Transylvanienne des Sciences Naturelles (Siebenbürgischer Verein für Naturwissenschaften), Hermannstadt, Sibiu.

Academia Romana, Bibliothèque, Calea Victoriei, 125, Bucarest.

Russie (U.S.S.R.):

Société Entomologique de Russie (Revue Russe d'Entomologie et Horae), Musée Zoologique de l'Académie des Sciences, Léningrad.

Bibliothèque de l'Académie des Sciences de l'Ukraine, 58a, Rue Korolenko, Kiew (Ukraine).

Société des Naturalistes de Kiew, 37-10, Rue Korolenko, Kiew (Ukraine).

Institut des Recherches Biologiques de l'Université de Perm, Perm II, Zaimka.

Institute for Plant Protection, Bureau of Applied Entomology and Zoology, Library, 10, Elagin Ostrov, Léningrad.

Rédaction du Journal « Plant Protection », 7, Rue Tschaikovsky, Leningrad.

Institute for controlling Pests and Diseases, Library, 7, Tschaikovsky Str., Leningrad 28.

Siam:

Department of Agriculture and Fisheries, Entomology Section, Bangkok.

Suède:

K. Swenska Vetenskapsakademien i Stockholm, Stockholm 50.

Entomologiska Foreningen, Brottninggatten 94, Stockholm.

Göteborgs Kungl. Vetenskaps-och Vitterhets Samhälles, Göteborg.

Statens Växtskyddsanstalt, Stockholm 19.

Bibliothèque de l'Université de Lund, Lund.

Suisse:

Bibliothèque de la Société Entomologique Suisse, Musée d'Histoire Naturelle, Berne.

Zentralbibliotek, Naturforschenden Gesellschaft, Zurich.

Tcheco-Slovaquie:

Societas Entomologica (Casopis), u Karlova 3, Prague II.

Section Entomologique du Musée National de Prague (Sbornik), Prague II-1700.

Bibliothèque de la Société Zoologique Tchécoslovaque, Institut de Zoologie, Karlov 3, Prague II.

Uruguay (République de l'):

Escuela de Veterinaria del Uruguay (Anales de la Escuela de Veterinaria del Uruguay), Itazaingo 1461, Montévideo.

Sociedad de Biologia de Montevideo, Casilla de Correo 567, Montevideo.

Yougo-Slavie:

Societas Entomologica Jugoslavica (Glasnik), 17, Garasaninovo ulica, Belgrade.

Abonnements de la Société

The Transactions and Proceedings of the Royal Entomological Society of London.

The Macrolepidoptera of the World, édité par le Dr. A. Seitz (suspendu depuis Juin 1937).

Coleopterorum Catalogus, édité par W. Junk - S. Schenkling (suspendu depuis Août 1937).

N.B. — Pour changement d'adresse, erreurs ou omissions, s'adresser à Monsieur le Secrétaire Général de la Société Fouad Ier d'Entomologie, Boîte Postale N° 430, au Caire.

Séance du 24 Janvier 1940

Présidence de S.E. FOUAD ABAZA Pacha

Nécrologie :

Le Secrétaire Général a le regret d'annoncer le décès de SAID BAHGAT Bey, survenu le 5 Janvier.

SAID BAHGAT Bey faisait partie de la Société depuis 1928. En 1936, il avait été élu membre de notre Conseil d'Administration. Avec la mort de ce distingué collègue, la Société perd un de ses membres des plus dévoués.

Est également annoncée la mort du Dr. EDOUARD BUGNION, membre honoraire de la Société dès sa fondation. Le Dr. BUGNION avait largement contribué aux travaux de la Société par ses nombreuses études publiées dans nos Bulletins.

Don à la Bibliothèque :

Messieurs le Docteur M. WALY, A. H. AL-HUSSAINI et M. HAFEZ ont fait parvenir un exemplaire de leur travail intitulé « Dissection and Histology of the Egyptian Toad », publié au Caire, en 1939 (première édition).

Le Conseil remercie.

Echange de Publications :

La REVISTA FACULTAD NACIONAL DE AGRONOMIA, de Medellin, République de Colombie, se fait inscrire sur notre liste des échanges.

Admission :

Monsieur MOHAMED IBRAHIM NOUR EL DIN, de la Faculté d'Agriculture, Université Fouad I^er^, proposé par Messieurs ABDEL AZIZ LOUTFY et A. ALFIERI, est admis à faire partie de la Société en qualité de membre titulaire.

Pr.

The larva of *Trinodes flavus* Motsch.

[Coleoptera : Dermestidae]

(with 5 Text-Figures)

by Prof. Dr. H. PRIESNER

On examining fallen leaves under hedges composed of *Clerodendron inermis* and *Bougainvillea*, at Montazah near Alexandria, I found as one of the more common insects living in the detritus under the hedges, a small, globiform larva, measuring from 1.5 to 2 mm., being of a brownish colour with ochrous head, and very hairy. I thought it belonging to the *Dermestidae* or *Ptinidae* but was unable to place it, as I had never before seen anything similar.

About a dozen of the specimens were brought to Cairo, and placed in a small dish for the purpose of breeding them, and thus ascertaining the species. I fed the larvae with dead house-flies; a few of the larvae finally pupated (after about a fortnight), and within another week specimens of *Trinodes flavus* Motsch. emerged.

I am not certain whether the larvae feed on dead insects also in the open but I suppose so, as the high mortality observed under laboratory conditions may very well be ascribed but to lack of humidity in the watch-glasses wherein they were bred.

A close description of the larva I consider superfluous, as the figures, given by B. Assaad Eff. show most of the characteristic details, particularly the most peculiar hairs or bristles. There are three main types of bristles on the body — on all segments excepting the head —, two of them (Figs. 2 and 3) more or less of the shape of a twig with needles of the *Araucaria* tree; the third type (Fig. 4) is smaller and finer, with blunt, hooked tip. Another bristle-type is present on the legs, similar to that shown in Fig. 3 but smaller, and not widened towards tip, slightly plumose, pointed, and hollow within, nearly throughout its length. The bristles as shown in Fig. 2 are about 0.3 mm. long, those as in Fig. 3 attain 0.600-0.675 mm., whilst the brirstle-type illustrated in Fig. 4, i.e. the hooked bristles are about 0.3-0.4 mm. long; those on the legs vary greatly in length (0.07-0.10 mm.) but are much smaller than the others.

In large specimens, the head is 0.47 mm. long and 0.50 mm. broad; there are 2+2 ocelli at the sides, and the antennae are very small, 2-jointed, with a stout sense-cone at the apex of joint 1; head above with scattered

hairs which are fine, somewhat curved, and plumose, when seen under high magnification. Mandibles with blunt teeth ; maxillary palpi 4-5-jointed, terminal joint 36-39 μ long, the preceeding joints short, transverse.

Legs fairly long, claw long and somewhat curved, that of the fore leg about 75 μ in length.

Fig. 1. — Full grown larva of *Trinodes flavus* Motsch. (from a microscopic balsam-mount; distended). — × 8.25.

Figs. 2-4. — Three main types of bristles occuring on *Trinodes flavus* Motsch. larva.

The shape of the body is much more compact in the living specimens than shown in Fig. 1, as this figure is purposely based on a somewhat dis-

tended example of a microscopic mount ; the living insect is short and strongly convex, almost globiform. The dorsum of the segments is somewhat more strongly chitinized transversally, and particularly the fore margin of the tergites is marked by a dark line. The pronotum is longer than the remaining segments, and about trapezoidal in shape ; from above, seven abdominal

Fig. 5. — *Trinodes flavus* Motsch.: adult. — × 42.

segments are discernible, the ultimate of which is broadly and evenly rounded.

Pupation took place inside the chitinous remains of the bodies of the flies given as food, and the pupa would rest — as it is the case with *Anthrenus* and other *Dermestidae* — inside the last larval exuvia.

Trinodes is a small genus, composed of but 6 Palaearctic species :

The common European *Trinodes hirtus* F., of which Ganglbauer said to have found it in the webs of the house-spider (*Tegenaria*) feeding on the dead remains of insects left by the spider in its net. From Algeria, Pic described *Trinodes curtus*.

Trinodes flavus Motsch. and *Trinodes bicoloratus* Pic are described from Egypt, and are recorded from this country only. *Trinodes flavus* Motsch. occurs not only in the northern coastal region (Mariout, Alexandria, Port-Said) but also in the latitude of Cairo, as Alfieri's and Rabinovitch's collections contain a number of specimens from El-Marg, Kubbah, Barrage and Helwan.

As to *Trinodes bicoloratus* Pic, a single specimen was found at Tamyia (Fayoum) on 13.III.1934, the description of which is given in Bulletin de la Société Fouad I[er] d'Entomologie, 1939, p. 144, and the type preserved in Alfieri's collection.

The two remaining species of the Palaearctic occur in China and Japan

A New Species of *Sarcophaga* from Egypt with a Note on the Male Hypopygium of *Sarcophaga Kadeisi* Salem

[Diptera: Sarcophagidae]

(with 2 Text-Figures)

by Hassan Hilmy Salem, M.B., M.Sc.,
Ph. D. (Fouad Ist University), D.T.M. and H. (England),
of the
Parasitology Department, Faculty of Medicine, Cairo.

Sarcophaga Tewfiki nov. spec. (♂)

Length about 8 to 9 mms. Frons is half the width of the eye. Frontal stripe black with golden reflections posteriorly. About eight frontal crossed bristles are present. Parafrontals grey with dark and gold reflections. Measured at the level of the first frontal pair of crossed bristles each equals about one fifth of the width of the frontal stripe. Parafrontalia with a very weak row of short hairs. Postoculars in two rows but on the median occipital region there are three rows. Second antennal segment dark but with marked orange reflections. Third antennal segment entirely dark and is two and half times as long as the second segment. Arista is one and a quarter as long as the third antennal segment. Maxillary palps club-shaped, mainly black, apex with golden reflections and is very slightly shorter than the arista. Antennae occupy nearly 4/5th of the distance between antennal roots and epistome. *Thorax* greenish grey with three black longitudinal stripes. Only one pair of posterior acrostichals and two pairs of posterior dorso-centrals are present. Crossed scutellar apicals present. Rest of the bristles on the dorsal surface like other species. Propleura bare. Sternopleurals 2:1. Hypopleuron with the usual fan-shaped tuft of bristles. *Legs* all bare with the exception of a small ventral tuft of hairs and the macrochaetal row on the hind femorae Mid femorae without a well developed comb of spines. Mid tibiae with an antero-ventral bristle.

Wings : Costal bristle moderately developed. Third costal section slightly less than one and half times as long as the fifth section. First longitudinal vein bare, third longitudinal with few bristles.

Abdomen : Shimmering in colour with black, pale greenish-grey and silvery reflections. Third segment without any median marginals. Fourth abdominal segment with one pair of central posterior marginal bristles. Fifth segment with the usual row of bristles. Abdominal sternites with long soft hairs. A peculiar patch of few very black strong bristles is arranged on either side of the latero-apical part of the fourth sternite reminding one of

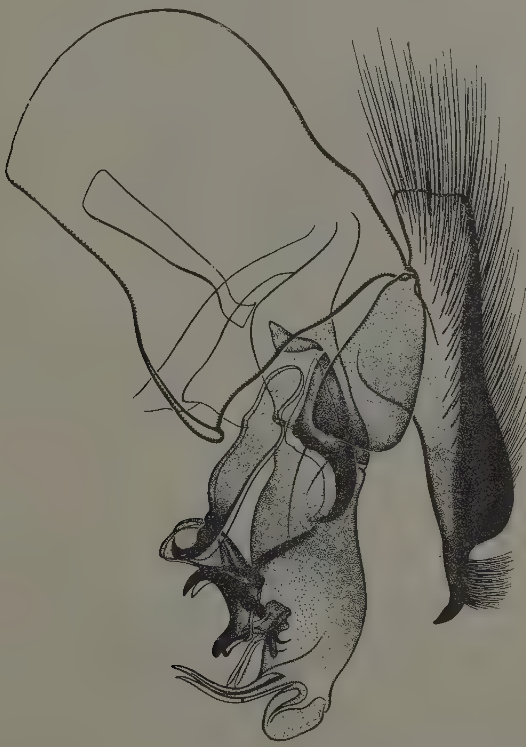


Fig. 1. — Male hypopygium of *Sarcophaga Tewfiki* nov. spec.

the patch of dense hairs soft of the fourth sternite seen in Oriental and Australian Sarcophagidae and rendering this species extremely easy to pick among the Egyptian *Sarcophaga* as it is the sole species known till now to possess such a peculiar fourth sternite. Lamellae of fifth sternite orange in colour and with few stiff bristles attached apically. Seventh tergum bright orange with some grey dusting posteriorly but without a marginal row of

bristles apically. Tenth tergum entirely orange and is about half as long as the seventh tergite. It is also markedly domed in appearance.

Male Hypopygium : Anal cerci very dark brown to black in colour with a marked hump on the ventro-median margin beyond which the plate is much narrowed and the margins run evenly to a curved and pointed apex. Immediately proximal to the apex and below the above mentioned hump on the same margin is a characteristic tuft of soft hairs. This is again the only known Egyptian species to possess such a tuft of hairs on the anal cercus. This character together with the patch of long bristles on either side of the hind margin of the fourth sternite form a very reliable and easy way of spotting this fly. *Distal segment of ninth coxite* orange colour and triangular with the apex between the tenth tergite and the anal cercus covered with long black hairs. *Parameres* anterior pair longer than the posterior, apical ends curved upwards and flat not rolled. The posterior pair is not much hooked but is more darkly chitinised than the anterior pair and possesses two bristles near its base, the proximal of which is more than double the length of the distal.

Phallosome : Proximal part measured from the base of the posterior paramere to the joint is half as long as the distal. End piece is more swollen and darkly chitinised basally and carries a complicated group of bilaterally symmetrical gadgets. Distal part of the end-piece very pale and more or less blunty pointed. The gadgets carried on the dorsal surface of the proximal part of the end piece are best understood by reference to the drawing. They are arranged as follows from above downwards :

(1) A markedly convex broad plate below which (2) a pair of very dark hook-like structures and below these (3) one pair of short narrow toothed rods (4) and just above the terminal part of the end piece are two elongated apodemes and most distally the lobe-like blunt apical part.

Locality : Three males were found in the collection, all carrying the label of Wadi Edeib, 26.II-7.III.1938. The types are in the collection of the Entomology Department, Faculty of Science, Cairo. This species is named after its collector Mohamed Tewfik effendi, Technical Assistant of the Entomology Department, Faculty of Science, Cairo, in recognition of his valuable services.

Sarcophaga Kadeisi Salem

Described by the author in 1938 from Ein Kadeis, Sinai. One male in the collection of Prof. H. C. Efflatoum Bey was found. Since in the first description of the male hypopygium the terminal parts of the phallosome were slightly damaged a new drawing and a description of the hypopygium from an intact specimen seemed preferable.

Male Hypopygium : Anal cerci moderately hairy at base. Apical part far less so. Anterior margin with a pre-apical emargination. Posterior margin evenly curved. Distal segment of ninth coxite more or less rectangular. plate with a nipple-like process at the lower dorsal angle where it touches the cercus.

Fig. 2. — Male hypopygium of *Sarcophaga Kadeisi* Salem.

Parameres : Anterior pair longer than the posterior. Anterior pair slightly expanded plate-like but the posterior is hooked apically and is provided with two short bristles on the anterior margin pre-apically. *Phallosome* with its basal segment nearly of the same length as the apical segment. It is well chitinised dorsally and ventrally and not much so laterally. The end piece carries the following parts dorso-ventrally and from above downwards :

(1) A single median oval lobe with very dark chitinisation on its lower

surface and with characteristic teeth on the dorsal half of its lower margin.

(2) One pair of long narrow apodemes taking origin from the proximal lateral parts of the bilobed end piece of the phallosome.

(3) Projecting from the dorsal cavity of the end piece below the first lobe is a pair of lightly chitinised bars. These run downwards between the apodemes already mentioned; their broad apices then curve gently upwards towards the lobe.

(4) The ventral part of the end piece is slightly bilobed and well chitinised and does not reach to the level of the apodemes nor the bars already referred to.

One male carrying the label of Wadi Edeib, 26.II-7.III.1938 and belonging to the collection of the Entomology Department, Faculty of Science, Cairo.

Séance du 14 Février 1940

Présidence de Monsieur le Professeur H. C. EFFLATOUN Bey,
Vice-Président

Further observations on *Anopheles rupicolus* Lewis, *Culex arbieeni* Salem, and *Culex theileri* Theobald

[Diptera: Culicidae]

(with 6 Text-Figures)

by HASSAN HILMY SALEM, M.B., M.Sc.,
Ph. D. (Fouad Ist University), D.T.M. and H. (England),
of the
Parasitology Department, Faculty of Medicine, Cairo.

In 1938, in a description of the Mosquito Fauna of Sinai Peninsula (Egyptian University Publication No. 16) two new species of Culicidae were described by the author. The first was a species of *Anopheles* which was named *aegypti* and the second was a species of *Culex* named *arbieeni*. Immediately after publication, Dr. F. Edwards of the British Museum informed the writer that the new *Anopheles* had been just described by Lewis from Gabel Moya in the Blue Nile Province (Anglo Egyptian Sudan) under the name of *rupicolus*. On referring to Lewis's description, it was evident that his species *rupicolus* and *aegypti* Salem were one and the same. Therefore *aegypti* Salem falls synonymous with *rupicolus* Lewis which remains the valid name.

Anopheles rupicolus Lewis

Lewis did not describe the egg stage of this mosquito but the author described and fully illustrated the egg as well as the other stages of this

species. Few and minor differences do exist between the Egyptian material and the description of Lewis but in the opinion of the writer these do not merit a new specific name for the mosquito.

A pale median tuft of scales on the anterior promontory of the mesonotum was mentioned by Lewis in his description. Such a tuft is entirely absent from the Egyptian material. In our material the mesonotum is shiny and is of pale brown colour and only sparsely covered with long bristles. In our description of the hypopygium it was mentioned that the phallosome possessed three leaflets on either side. On re-examination and dissection of new material it was found to possess five leaflets and thus conforms with the description of Lewis.

Culex arbieeni Salem

(Figs 1-5)

Dr. F. Edwards suggested too that the second mosquito described in the paper as *Culex arbieeni* is very similar to *Culex apicalis*. I have not been able to examine the latter species but from Martini's description of *Culex apicalis* Adams and its variety *judaicus* Edwards, my conclusion is that though the two species may possess similar abdominal markings in the adult stage, yet there should be no doubt whatsoever about the validity of *arbieeni* Salem. Recently the author had the chance of again visiting Sinai and collecting some larvae and breeding the adults. The findings from a very careful study of the successive larval and pupal pelts as well as the hatched adults show that *arbieeni* Salem is a distinct species in several respects :

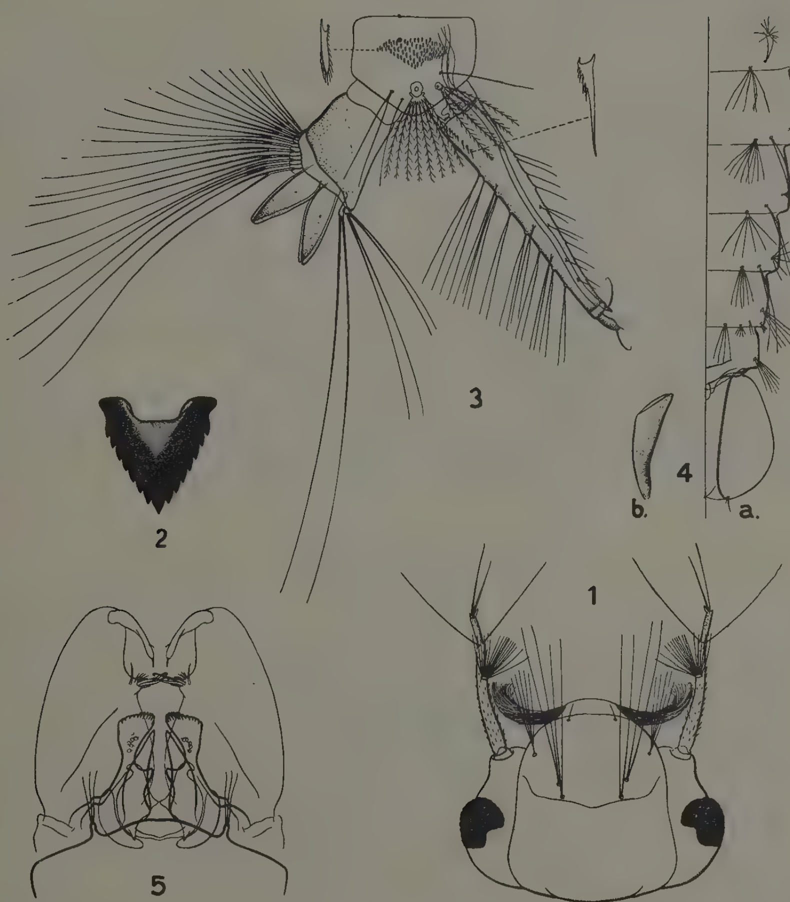
(1) In the larval stage *Culex arbieeni* Salem is very different from any other species of *Culex* hitherto described. Its head and respiratory syphon are re-illustrated for the sake of clarity. Especially peculiar are :

(a) The point of insertion of the antennal hair tuft, being situated slightly on the proximal side of the basal half of the antenna. The sub-terminal setae and their length and position.

(b) The arrangement of the hair tufts on the respiratory syphon is extremely peculiar to this larva and really is its most characteristic feature. The presence and arrangement of the sub-terminal hair tufts together with several laterals and some dorsals are outstanding characters. Also the abnormal length of the four terminal syphonal hairs.

(2) In the adult stage *Culex arbieeni* Salem is also a very distinct species. The female has the peculiar feature that its maxillary palp are longer than usual being about one-fourth of the length of the proboscis.

(3) In the male, the hypopygium has well-marked features that render its separation from other species quite simple. Since in the first account that appeared about this mosquito the description of the pupa and male hypopygium were made from slightly squashed specimens, and since new material



Culex arbieeni Salem.

Fig. 1. — Head of fourth stage larva showing the frontal hairs, antennae with the sub-terminal and terminal setae.

Fig. 2. — Mentum.

Fig. 3. — Last abdominal segments of fourth stage larva, the eighth segment with the comb, the syphon with its peculiar hair tufts and the anal segment.

Fig. 4. — Pupa: a. Abdominal segments showing the arrangement of the bristles; b. Respiratory trumpet of same.

Fig. 5. — Adult: Male hypopygium showing the different parts and their arrangement.

is now available certain amendments to the original description were found necessary.

The Pupa

Seta A on the fourth segment with four very delicate branches but on the fifth and sixth segments this seta has 4 or 5 delicate branches. On the seventh segment it has five to six well developed branches each nearly three-quarters as long as the segment. On the eighth segment it has six to seven branches similar to those of the proceeding segment only slightly shorter.

Seta B on IV with two long feathered branches slightly longer than the segment, on V and VI again it has also two branches much longer than the segment. On VII with two very delicate short branches.

Seta C on IV, V, VI and VII with nine, six, six and four delicate branches nearly three-quarters of the length of the segment.

Paddle has the ratio of its length to breadth 4:3. Trumpets with a radio of 4:1 branch being taken at the apical opening of the trumpets. Paddle nearly one and a quarter times as long as the trumpets.

Two paddle hairs one long and the other short are present.

The Male Hypopygium

Side-piece densely hairy on the dorsal surface. No scales are present. It is nearly one and half times as long as broad, breadth being taken at the base of the side-piece. Sub-apical lobe of side-piece of moderate development. It carries one pair of long strongly hooked finger-like processes. No plate of any type exists on this lobe but distal to the attachment of the former hooked processes there are two pairs of fine pointed bristles on the lobe. Clapser nearly half as long as the side-piece. Its sub-terminal digit-like appendage is well developed and measures nearly one quarter of the length of the clasper. Tenth sternite without a basal arm. It carries terminally a crown of few short blunt thorn-like spines averaging about six in number and other shorter and sharper spines. The ventro-lateral plates of the anal segment has a group of seven sensory pits with sensory hairs. The lower part of the median margin of the ventro-lateral plate of the anal segment is not straight but is deeply emarginate ending in a strong sharp tooth on level with the apex of the phallosome (see Fig. 5). The dorsal plate of the anal segment is well represented by an apically blunt elongate plate. Phallosome is very simple being made up of only one single short broad-like plate with its apex narrow and strongly curved outwards, terminating at the level of the tooth at the bottom of the concave margin of the ventro-lateral plate of the anal segment. Parameral plates very small, oval in shape and articulating to the apices of the basal plates as usual. Lobes of ninth tergum small and nipple-like and each with three long fine hairs.

The characteristic features of this hypopygium may be summarised as follows :

(1) Lobe of side-piece without plates and only with two strongly hooked finger-like processes.

(2) The deep emargination and the prominent tooth-like projection on the median margin of the ventro-lateral plate of the anal sclerite.

(3) The simplicity of construction of the phallosome and the small size of the parameral plates.

The types are in the collection of the Parasitology Department and the adults as well as the larvae were collected from a water reservoir in Wadi El Arbieen near the Monastry of Saint Catherine in the Sinai.

An uncommon arrangement of the parts of the Male Hypopygium in *Culex theileri* Theobald

In two male specimens of *Culex theileri* Theobald from Kharga Oasis the division of the phallosome were in an uncommon position being more or less spread outwards. The simple and bluntly pointed inner division is

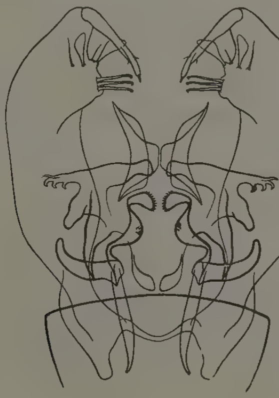


Fig. 6. — *Culex theileri* Theobald : Functioning position.

directed here outwards and downwards directly in front of the curved handle of the basal arm of the ventro-lateral plate of the anal segment, instead of being directed downwards and outwards the crown of the thorn-like spines on the apex of this plate (see Fig. 6). The second division of the phallosome with its characteristic four teeth is here curved outwards and upwards towards the basal arms of the tenth sternite. The parameres are horizontally displaced instead of their usual vertical position in relation to the basal plates.

It seems that the present position of the parameres is more or less responsible for the general displacement of the parts of the phallosome.

Edwards directed the attention of displacement in a specimen of *Culex pallidocephalus* in 1914. He said that "Normally the small basal parts of the hypopygium are in the relative position in which they are shown in this hypopygium (unci, harpagones and harpes), but sometimes (perhaps after use) they take up another position relatively to one another, in which the unci are folded outwards and the harpagones pushed out so that they occupy a position at right angles to the normal one." The figure of *Culex pallidocephalus* (Bull. Ent. Res., May 1913) represents these parts in this position; a specimen in which they are thus placed (and the dislocation may occur in any species of *Culex*) at first sight appears to possess a very different structure from one in which the position is normal. Martini has published figures for *Culex modestus* and *Culex laticinctus* in a similar condition which he names "Funktion stellung." Such a displacement of parts is not common in mosquitoes and at first sight is apt to mislead those studying these complicated structures and for this reason an illustration of the male hypopygium in this uncommon position is certainly not superfluous.

There are two other points in which these mosquitoes differed from the ordinary form of *Culex theileri* Theobald :

(1) The possession of two lower meso-epimeral bristles (Kirkpatrick does not mention the number of lower meso-epimerals). In the Egyptian material I examined one bristle was always present and in a Chinese specimen received from the late Dr. A. Evens of the Liverpool School of Tropical Medicine two bristles were found.

(2) The pale yellow central bands of scales reach to the apex segments of the abdominal early as from the second segment and the pale scales tend to cover practically the whole segment save for small patches on either side of the middle band. The apical part of these bands touches the posterior margin of the abdominal segments and they tend to spread also to the apex of the segments.

R 41

Etude préliminaire des *Leptolarra* Cam. (=*Notogonia* Costa) de la faune égyptienne

[Hymenoptera : Sphecidae]

par JACQUES DE BEAUMONT

La question du nom générique à adopter pour ces insectes n'est pas complètement résolue. Alors que Richards admet *Leptolarra* Cam., Pate voudrait qu'on les nomme *Motes* Kohl. A mon avis, les espèces devraient former un simple sous-genre de *Liris* F.

D'autre part, la synonymie de certaines espèces étant très embrouillée, les noms ci-dessous ne sont, peut-être, que provisoires.

Leptolarra memnonia Sm.

♂. — Fémurs postérieurs fortement échancrés; 5ᵉ sternite avec une touffe de poils de chaque côté. Des bandes de pruinosité sur les 3 premiers tergites.

♀. — Aire pygidiale mate et velue; bandes de pruinosité comme chez le ♂.

Leptolarra aff. memnonia Sm.

Diffère de la précédente par la présence de pruinosité sur les 4 premiers tergites. Le ♂ n'a pas de touffes de poils au 5ᵉ sternite.

Leptolarra aff. solstitialis Sm.

Bien reconnaissable à ses pattes en partie rouges. Le ♂ a les fémurs peu échancrés et de longs poils au 4ᵉ sternite.

Leptolarra agilis Sm. (= pompiliformis auct.)

Aire pygidiale de la ♀ brillante. Fémurs postérieurs du ♂ simples.

Certaines ♀♀, à aire pygidiale plus large et moins ponctuée, sont probablement des *opalipennis* Kohl.

Leptolarra nigrita Lep.

Facilement identifiable à sa grande taille et à ses ailes enfumées. Le ♂ est caractérisé par une gouttière longitudinale à la face inférieure de ses fémurs postérieurs.

Leptolarra pharaonum Kohl

N'est probablement qu'une variété de petite taille et à ailes peu enfumées de *Leptolarra nigrita* Lep.

Leptolarra praetermissa Richards

Thorax plus nettement ponctué que chez les espèces précédentes. Segment médiaire à sculpture plus forte. Aire pygidiale de la ♀ mate et velue. Fémurs postérieurs du ♂ simples. Ponctuation des mésopleures très dense dans les deux sexes. Articles 3-13 des antennes du ♂ subégaux, longs.

Leptolarra nigricans Walk.

Se distingue de *Leptolarra praetermissa* Rich. par la ponctuation des mésopleures plus espacée et par la structure des antennes du ♂ à articles 3-5 assez courts, articles 6-13 longs.

Leptolarra ? miscophoïdes Arnold

Petite espèce, caractérisée par une bande foncée en travers des ailes.

Assemblée Générale Ordinaire
du 28 Février 1940

Présidence de Monsieur le Professeur H. C. EFFLATOUN Bey,
Vice-Président

Rapport du Secrétaire Général (exercice 1939) :

Messieurs,

En dépit des événements actuels et des nombreuses difficultés que rencontrent un peu partout, en ces temps troublés, les diverses institutions scientifiques, la Société Fouad Ier d'Entomologie s'est efforcée de maintenir son activité des années précédentes. Un aperçu de la situation morale et financière de l'Exercice vous est donné par le Rapport qui vous est soumis aujourd'hui.

Tout d'abord, se conformant au vœu que vous avez formulé au cours de l'Assemblée Générale Ordinaire du 8 Mars 1939, votre Conseil a entrepris de nombreuses démarches relatives à la Présidence de la Société. Si aucun résultat n'a pu encore être obtenu, il faut l'attribuer aux préoccupations actuelles des autorités compétentes.

Le fait dominant de l'Exercice est la forte recrudescence des visiteurs. Fonctionnaires et universitaires, techniciens ou étudiants, ont régulièrement consulté notre bibilothèque et nos collections. Il leur a été fourni tous les renseignements désirés et de nombreuses déterminations d'insectes.

Notre Bulletin pour l'année 1938 a été distribué au mois de Mars. Cette publication de plus de 400 pages, illustrée de très nombreuses figures et de deux planches en couleurs, contient vingt études originales d'un niveau scientifique élevé.

Une importante collection de Lychens d'Egypte, recueillis et déterminés par feu E. Sickenberger, est venue enrichir notre herbier.

L'enregistrement des ouvrages, périodiques ou brochures en Bibliothèque atteint le nombre de 12729, contre 11714 en 1938, en augmentation de 1015 unités.

Des démarches entreprises pour la réduction de l'impôt foncier l'ont porté de L.E. 57.600 à L.E. 36 annuellement.

Le nombre de nos membres, de toutes catégories, est de 324, en légère augmentation malgré divers démissions et décès.

De nombreuses conférences ont été données dans notre local par diverses institutions scientifiques.

Nous adressons à Son Excellence le Ministre de l'Agriculture nos remerciements bien chaleureux pour la subvention annuelle qu'Elle nous a fait verser par son Ministère.

Votre Trésorier a établi le Bilan des Comptes de l'Exercice et vos Censeurs l'ont vérifié et approuvé.

Aux termes de l'article 13 des statuts le Conseil est annuellement renouvelé par tiers. Les membres sortants cette année sont les suivants : Son Excellence Fouad Abaza Pacha, Messieurs le Dr. H. Priesner, Richard Wilkinson et Abdel Megid el Mistikawy. Ils sont rééligibles.

Vous aurez également à élire deux Censeurs.

Nous terminons ce Rapport en dédiant nos respectueuses pensées à notre Bien-Aimé Souverain, Sa Majesté le Roi Farouk Ier et Lui exprimons nos sentiments de profonde dévotion et nos vœux les plus fervents.

Signé : A. ALFIERI

Rapport du Trésorier :

Situation au 31 Décembre 1939

Doit	L.E.	MM.	Avoir	L.E.	MM.
Compte Bâtiment (pour mémoire)	1	000	Compte Réserve Générale	15627	382
» Mobilier » »	1	000	» Subvention du Gouvernement	447	300
» Bibliothèque » »	1	000	» Coupons	703	807
» Collections » »	1	000	» Intérêts	40	552
» Laboratoire » »	1	000	» Cotisations	64	151
» Portefeuille	13535	913	» Diplômes	0	400
» National Bank of Egypt.	1972	878	» Vente Publications	8	000
» Cie du Gaz	4	629			
» Appointements........	819	000			
» Publications	286	702			
» Frais Généraux et Entretien	180	601			
» Impôts et Assurances..	86	869			
	16891	592		16891	592

Inventaire

Actif	L.E.	MM.	Passif	L.E.	MM.
Bâtiment (pour mémoire)	1	000	Réserve Générale............	15518	420
Mobilier » »	1	000			
Bibliothèque » »	1	000			
Collections » »	1	000			
Laboratoire » »	1	000			
Portefeuille	13535	913			
National Bank of Egypt	1972	878			
Cie du Gaz..................	4	629			
	15518	420		15518	420

Le Portefeuille Titres en dépôt à la National Bank of Egypt se décompose comme suit :

145 Obligations Héliopolis 5 %.
9020 £ Dette Unifiée Egyptienne 4 %.
6700 £ Dette Privilégiée Egyptienne 3 ½ %.

Signé : R. WILKINSON

Rapport des Censeurs :

En exécution du mandat que vous avez bien voulu nous confier, nous avons l'honneur de porter à votre connaissance que nous avons vérifié les Comptes de la Société Fouad Ier d'Entomologie pour l'année finissant le 31 Décembre 1939 avec les régistres et documents y relatifs.

Nous certifions que le Bilan reflète d'une façon exacte et sincère la situation de la Société telle qu'elle ressort des régistres et des explications qui nous ont été données.

Signé : Dr. A. Azadian et E. Kaourk

Prévisions Budgétaires pour l'année 1940 :

Recettes **Dépenses**

Recettes	L.E.	MM.	Dépenses	L.E.	MM.
Subvention du Gouvernement Egyptien	450	000	Publications	200	000
Coupons	703	000	Appointements	819	000
Cotisations	60	000	Frais Généraux	150	000
Intérêts	40	000	Impôts	36	000
Vente Publications	5	000	Assurances	26	000
			Abonnements Bibliothèque	5	000
			Entretien	15	000
			Imprévus	7	000
	1258	000		1258	000

Signé : R. Wilkinson

Décisions :

1° L'Assemblée Générale Ordinaire approuve les Rapports du Secrétaire Général, du Trésorier et des Censeurs et donne décharge au Conseil de sa gestion pour l'exercice 1939.

2° Sur la proposition de Monsieur le Professeur H. C. Efflatoun Bey, l'Assemblée remercie le Secrétaire Général et le Trésorier des efforts qu'ils ont déployés au cours de l'exercice en vue de la bonne marche de la Société.

Elections :

Messieurs le Professeur Docteur H. PRIESNER, S.E. FOUAD ABAZA Pacha, RICHARD WILKINSON et ABDEL MEGID EL MISTIKAWY, membres du Conseil sortants, sont réélus.

Monsieur MOHAMED SOLIMAN EL ZOHEIRI est élu en remplacement du feu SAID BAHGAT Bey.

Messieurs le Docteur A. AZADIAN et E. KAOURK sont réélus aux fonctions de Censeurs des Comptes de la Société.

Séance du 27 Mars 1940

Présidence de Monsieur le Professeur MAHMOUD TEWFIK HIFNAOUI Bey, *Président.*

Présidence de la Société :

Par Décret Royal en date du 14 Février 1940 et publié dans le Journal Officiel du Gouvernement Egyptien, 67eme année, N° 18, du Lundi 19 Février 1940, Monsieur le Professeur MAHMOUD TEWFIK HIFNAOUI Bey, Ministre de l'Agriculture, est nommé Président de la Société Fouad Ier d'Entomologie.

Réception du nouveau Président :

Allocution de Monsieur le Professeur H. C. EFFLATOUN Bey. Vice-Président :

Monsieur le Président,

C'est avec une vive satisfaction que nous avons accueilli le Décret Royal du 14 Février 1940 relatif à votre nomination à la Présidence de la Société Fouad Ier d'Entomologie.

Au nom de Membres du Conseil d'Administration et de tous les membres de la Société, je vous adresse nos félicitations les plus sincères et nos vœux les meilleurs pour une longue et féconde présidence.

Guidée par vos conseils avisés et votre profonde expérience, la Société connaîtra, nous en sommes persuadés, un nouvel essor qui lui permettra de poursuivre, sous l'égide de son bien-aimé souverain Sa Majesté le Roi FAROUK Ier, la voie qui lui avait été tracée par son glorieux animateur et grand bienfaiteur, le très regretté FOUAD Ier.

Allocution de Monsieur le Professeur MAHMOUD TEWFIK HIFNAOUI Bey, Ministre de l'Agriculture et Président de la Société Fouad Ier d'Entomologie :

Monsieur le Vice-Président, Messieurs,

Notre bien-aimé souverain, Sa Majesté le Roi FAROUK Ier, a daigné me nommer Président de la Société Fouad Ier d'Entomologie.

Cette sollicitude royale m'honore et couronne vos nombreuses démarches relatives à la Présidence de la Société.

Je suis particulièrement heureux de la confiance que vous avez placée

en moi et je vous en remercie bien sincèrement. Vos félicitations et vos bons souhaits, et ceux qui m'ont été adressés par la plupart des membres de la Société m'ont également profondément touché. Je saisis cette occasion pour vous en exprimer tous mes remerciements.

Soyez convaincus que je m'emploierais de mon mieux aux intérêts et au développement de la Société. Comme l'ont fait mes prédécesseurs, je m'acquitterais de cette tâche en m'appuyant sur votre précieuse collaboration.

Nous sommes tous fiers du grand prestige dont jouit la Société de par le monde et nous travaillerons ensemble pour l'épanouissement, sous le règne de Sa Majesté le Roi FAROUK I^{er}, d'une si belle institution scientifique, œuvre du feu Roi FOUAD I^{er}.

L'allocution présidentielle est chaleureusement applaudie.

Dons à la Bibliothèque :

La Société a reçu les ouvrages suivants :

1° De Monsieur HENRI GADEAU DE KERVILLE, de Rouen (France) : un exemplaire de son « Voyage Zoologique d'Henri Gadeau de Kerville en Asie-Mineure (Avril-Mai 1912), Tome I, première partie, publié à Paris en 1939.

2° De Monsieur F. SILVESTRI, de Portici (Naples, Italie) : son remarquable travail « Compendio di Entomologia Applicata (Agraria-Forestale-Medica-Veterinaria), Parte Speciale, Vol. I (première et deuxième parties [2 volumes]), publié à Portici, 1934-1939.

Le Conseil remercie les généreux donateurs.

Nomination d'un Membre Honoraire :

Sur la proposition de Messieurs le Professeur Docteur H. PRIESNER et A. ALFIERI, Monsieur le Docteur F. SILVESTRI, de Portici (Naples, Italie), est nommé Membre Honoraire de la Société.

Admission de Membres :

Monsieur le Professeur MAHMOUD TEWFIK HIFNAOUI Bey, Ministre de l'Agriculture et Président de la Société Fouad I^{er} d'Entomologie est nommé membre titulaire de la Société.

Sont également admis à faire partie de la Société en qualité de membres titulaires :

Messieurs AHMED HOUSNY IBRAHIM, AHMED NOUR EL DIN et MICHEL ZAKI, de la Section d'Entomologie du Ministère de l'Agriculture, présentés par Monsieur le Professeur Docteur H. PRIESNER et MOHAMED SOLIMAN EL ZOHEIRY ; Monsieur MOHAMED FARGHAL ALY, étudiant à la Faculté d'Agriculture, Université Fouad I^{er}, présenté par Messieurs le Docteur HAMED SELEEM SOLIMAN et MOHAMED SOLIMAN EL ZOHEIRY.

Echanges :

Est approuvé l'échange des publications avec les Institutions suivantes :

1° Museo Libico di Storia Naturale, Piazza Santa Maria degli Angeli, Tripoli d'Africa, Libye (*Annali*).

2° Ufficio Idrobiologia e Pesca, Direzione Superiore Affari Colonizazione e Lavoro, Governo Generale dell'Africa Orientale Italiana, Addis Abeba, Abyssinie (*Bulletino*).

Elections :

Les votes relatifs à la constitution du Bureau du Conseil et du Comité Scientifique pour l'exercice 1940 donnent les résultats ci-dessous :

Sont élus : Monsieur le Professeur H. C. Efflatoun Bey et Monsieur le Professeur Docteur H. Priesner, *Vice-Présidents ;* Monsieur Anastase Alfieri, *Secrétaire Général ;* Monsieur Richard Wilkinson, *Trésorier.*

Sont élus membres du Comité Scientifique : Messieurs le Professeur H. C. Efflatoun Bey, le Professeur Docteur H. Priesner, le Docteur Kamel Mansour, le Docteur Mohamed Shafik, le Docteur Hamed Seleem Soliman, le Docteur Saadallah Mohamed Madwar, Mohamed Soliman El Zoheiry et Anastase Alfieri.

Ammoplanopterus nov. gen. *sinaiticus* nov. spec.

[Hymenoptera: Sphecidae-Pemphredoninae]

(con 8 Figure)

per il Dott. ALBERTO MOCHI

Un piccolo sfegide catturato all'Wadi Umm Mitla nel Sinai il 21 Marzo 1937, appartenente al sesso maschile, lungo 2.1 mm., presenta caratteri tali da render necessario di creare un genere nuovo.

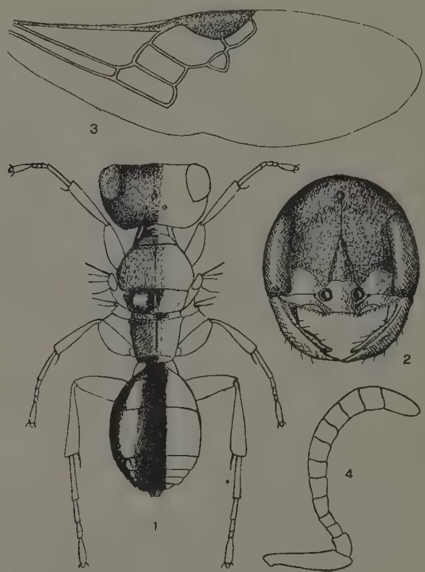
L'aspetto generale e la maggior parte dei caratteri son quelli del genere *Ammoplanus*, e cioè, testa con diametro trasverso maggiore di quello del torace, occipite e tempie sviluppatissimi, occhi che raggiungono le basi delle mandibole, clipeo bassissimo, antenne inserite subito a disopra del suo margine superiore, di 13 articoli (♂), con lo scapo molto lungo. Collare stretto, più basso del dorsulo, mesonoto e postscutello corti e larghi, segmento mediano lungo, troncato ad angolo retto indietro, senza area cordata. Addome ovalare, non peziolato, con 7 segmenti visibili, senza area pigidiale (♂). Zampe sottili, poco spinose, senza caratteri speciali. Nonostante queste coincidenze, il mio esemplare non può esser classificato nel genere *Ammoplanus* a causa della nervatura alare. Lo stigma è grosso come in questo genere; la cellula radiale però ha una forma speciale. La nervatura radiale, inflettendosi medialmente prima di raggiungere il margine dell'ala, viene ad incontrare il bordo laterale dello stigma e chiude così la cellula in modo che la parte alta dello stigma stesso viene a trovarsi fuori della regione delle nervature. Le cellule cubitali sono due e ricordano quelle dei *Miscophus*: la prima molto grande, simile a quella unica caratteristica del genere *Ammoplanus*, la seconda piccolissima, triangolare, appendicolata, sorgente verso la metà della lunghezza della nervatura che chiude lateralmente la prima, talchè si ha l'impressione che la porzione della nervatura cubitale che la chiude in basso si inserisca sulla prima ricorrente. Il resto della nervatura alare è come in *Ammoplanus* alle ali anteriori; per quanto riguarda le posteriori mi è impossibile un giudizio sicuro, perchè sono mal conservate nel mio esemplare: quello che ne rimane (parte basale) non differisce però dalla porzione corrispondente del genere *Ammoplanus*.

L'esemplare che ho sotto gli occhi presenta i seguenti caratteri specifici:

Colore del corpo nero lucente. Sono gialli il clipeo, una macchia al disopra

di ciascuna delle sue parti laterali estendentesi fino al margine oculare, le mandibole, il labbro e i palpi (labiali di 4, mascellari di 6 articoli), l'estremità dei femori, le tibie e i tarsi (le tibie e gli ultimi articoli tarsali intermedi e posteriori oscurati in bruno-ocra). Antenne giallo ocra. Scagliette brunastre. Stigma bruno-scuro unicolore, nervature alari giallo-ocra chiaro.

Parte media del clipeo con un piccolo dente ai lati del margine libero. Al disopra del clipeo, al mezzo, un leggero rilievo conico. L'ocello anteriore è



Ammoplanopterus nov. gen. *sinaiticus* nov. spec.

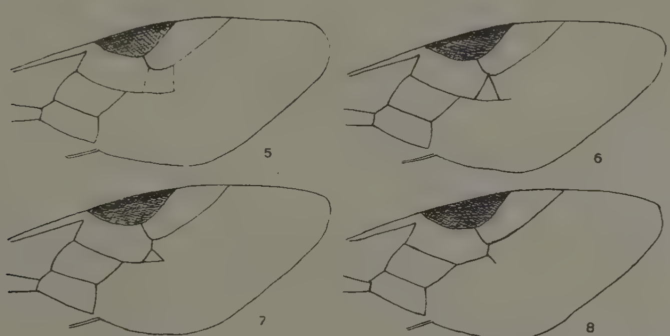
Fig. 1 : Aspetto generale e scultura. — Fig. 2 : Testa vista dal davanti. — Fig. 3 : Ala anteriore. — Fig. 4 : Antenna.

quasi sulla linea che congiunge i margini posteriori degli occhi, i posteriori sono assai più indietro, molto più vicini fra loro che alla linea che prolungherebbe idealmente il margine interno dell'occhio. Tutta la testa è lucente, microreticolata, senza macroscultura. Le mandibole sono bidentate all'apice, ondulate sul margine mediale. Le antenne hanno lo scapo un pò più lungo dei primi cinque articoli del funicolo insieme; di questi il primo (pedicello) è quasi due volte maggiore del secondo, gli altri aumentano gradualmente di lunghezza, l'ultimo è il più lungo di tutti, raggiungendo la lunghezza dei primi tre insieme. Le antenne sono nettamente clavate, la lunghezza del

dodicesimo articolo del funicolo al suo margine prossimale è una volta e mezzo quella del secondo al margine distale.

Il collare è trasversalmente macrostriato, il dorsulo microstriato longitudinalmente con le strie interrotte, leggermente solcato al mezzo nel senso longitudinale anteriormente, con pochi piccoli punti sparsi. Lo scutello, microstriato sui lati, presenta al mezzo un solco che lo divide in due; il postscutello è micropuntato sui lati, liscio al mezzo. Il segmento mediano porta una macrostriatura-reticolazione obliquo-trasversa e un solco mediano longitudinale netto. Le scagliette sono di conformazione ordinaria; le zampe non presentano speciali caratteri; le unghie sono piccole, semplici, i pulvilli mediocremente sviluppati.

L'addome è tutto liscio, lucentissimo, con gli ultimi tergiti pelosi sui lati, il pigidio troncato (♂). Dal lato ventrale i margini distali del terzo, quarto e quinto sternite sono muniti di peli assai lunghi che, verso il mezzo, si riuniscono a formare ad ogni lato della linea mediana penneli appuntiti agglutinati, ben visibili di profilo.



Figg. 5-8. — Vedute teoriche nel passagio dai generi *Stigmus* o *Spilomena* al genere *Ammoplanus* per riduzione della seconda cellula cubitale.

Le piccole specie appartenenti al genere *Ammoplanus* e affini sono state studiate soltanto negli ultimi anni. Il Gussakovskij (1) ha scisso il genere in due sottogeneri, *Ammoplanus* s.str. con la cellula radiale chiusa, *Ammoplanellus* con la detta cellula aperta; ha inoltre descritto un genere nuovo, *Ammoplanops* che, pur presentando la nervatura alare come nel genere *Ammoplanus*, per altri caratteri si avvicina ai *Diodontus*. Il genere *Ammoplanopterus* presenta uno speciale interesse soprattuto perchè verifica vedute teoriche

(1) Gussakovskij: Revision der Gattung *Ammoplanus* Giraud und einiger verwandten Sphegidengattungen (Bolet. de la Soc. espan. de historia natural, 1931, pag. 437).

che il Kohl aveva emesse fin dal 1896 [2]. Questo autore ha pensato che il passaggio dal genere *Stigmus* o *Spilomena* con due cellule cubitali al genere *Ammoplanus* con una sola dovesse essersi effettuato per fusione della prima con la seconda nervatura ricorrente, dapprima parziale (seconda cellula cubitale triangolare o appendicolata), poi totale (seconda cellula cubitale scomparsa). Basta confrontare il disegno della nervatura alare di *Ammoplanopterus* con gli schemi del Kohl (Figg. 5-8) per osservare la coincidenza della struttura osservata con quella teoricamente dedotta.

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(2) Kohl: Die Gattungen der Sphegiden (Ann. des k.k. naturhistor. Hofmus. Wien, XI, 1896, pag. 272).

Zwei neue Goldwespen aus Aegypten

[Hymenoptera: Chrysididae]

von Dr. STEPHAN ZIMMERMANN, Wien

In einer mir von Herrn A. Mochi, Cairo, zur Determination übersandten Kollektion aegyptischer Chrysididen fanden sich zwei neue Arten, die im Folgendem beschrieben werden.

Notozus discedens nov. spec.

Kopf: Genae überaus kurz, Voldergesicht sehr breit und fast glatt. Cavitas facialis mässig vertieft, glatt, in ihrer Mitte eine seichte Längsrinne, oben ohne Abschlussleiste. Vor den Ocellen beginnt eine spärliche grobe Punktierung, die am Hinterkopf etwas dichter wird; die Zwischenräume zwischen den Punkten sind vollständig glatt.

Thorax: Vorderecken des Pronotums verrundet. Die Oberfläche des Pronotums ist im vorderen Drittel fast glatt, etwas vor der Mitte liegt eine Reihe grober, regelmässiger, dahinter schwächere, unregelmässigere Punkte; die glatten Zwischenräume sind wie poliert. Mesonotum und Scutellum fast glatt, mit spärlichen gröberen Punkten. Metanotum-Lamelle bis zur Hälfte leicht konvergierend, knapp hinter der Mitte am schmälsten, hinter der Mitte unter geringer Verbreiterung gleichmässig verrundet; ihre Oberseite dicht und grob punktiert.

Abdomen: Gestreckt herzförmig. 1. Segment sehr kurz, an der Basis eingedrückt, fast glatt, nur an den Vorderecken mit spärlichen gröberen Punkten besetzt. 2. Segment vorne in der Mitte fast glatt, gegen die Seiten zu mit erst schwächeren, sodann gröberen Punkten; an den Seiten- und Hinterecken des Segmentes spärlichst weissliche Behaarung. 3. Segment nach hinten rüsselartig vorgezogen, am Hinterende eine hufeisenförmige Anhangplatte. Die Seitenränder des 3. Tergites sind je einmal leicht ausgebogen; die Punktierung besteht aus tiefen, grossen Gruben; spärliche, lange, weisse Behaarung.

Klauen der Vorderbeine einfach, ohne Zähne oder Borsten; an der Innenseite der Basis der Klauen ist eine erst bei etwa 60 facher Vergrösserung sichtbare, äussert schwache knötchenartige Verdickung zu erkennen, die keinesfalls als Zähnchen bezeichnet werden kann. Klauen der Hinterbeine ebenso, die auch hier vorhandene äusserst schwache Verdickung an der Innenseite der Basis trägt eine winzige Borste.

Färbung: Fühlerschaft metallisch grün, Fühlergeissel schwarzbraun. Mandibeln und Anhangplatte des 3. Tergits hellbraun, Tarsen und Ende der Tibien gelb, das ganze übrige Tier glänzend smaragdgrün.

Flügel glashell, Flügelgeäder für *Notozus* typisch, jedoch äusserst schwach.

Länge: 3 mm. — 1 Exemplar.

Einige weisse Haare in der Schläfengegend des Kopfes sprechen für das ♂ Geschlecht des Tieres.

Vergleiche mit den beiden bisher aus Afrika beschriebenen *Notozus*-Arten (*Notozus decorsei* Buyss. [Rev. Ent., Caen, Vol. 23, pag. 253. 1904], und *Notozus afer* Mocs. [Monogr. Chrys., pag. 75, 1889]) erübrigen sich im Hinblicke auf die vorstenhende Beschreibung. Leider ist die Klauenbildung von *Notozus decorsei* und *Notozus afer* aus den Beschreibungen nicht ersichtlich; von allen europäischen und mediterranen *Notozus*-Formen unterscheidet sich die neue Art jedenfalls durch die zahnlosen, einfach sichelförmigen Klauen. — Aus Aegypten bisher angegeben: *Notozus productus* Dahlb. (Buysson: Mém. Soc. Ent. Egypte, Vol. 1, pag. 12, 1908) und *Notozus spina* var. *rufitarsis* Tournier (Trautmann: Bull. Soc. Roy. Ent. Egypte, pag. 90. 1926).

Fundort: Abu Rawash, Aegypten, leg. A. Mochi.

Type in Coll. A. Mochi, Cairo.

Hedychridium luteum nov. spec.

Kopf: Genae ganz kurz, beim ♂ immerhin noch als schmale vorspringende Leisten entwickelt, bei den ♀ ein Zwischenraum zwischen dem Unterrande der Augen und der Basis der Mandibeln kaum wahrnehmbar. Vordergesicht ziemlich breit, Cavitas facialis mässig tief, an den Seiten und unten dicht und fein, oben gröber punktiert; diese gröbere Punktierung reicht in spitzförmiger Ausdehnung von der Stirne in die Mitte der Cavitas herunter, eine scharfe Grenze zwischen Cavitas und Stirne ist daher nicht vorhanden. Stirn und Scheitel dicht und grob. Hinterkopf etwas schwächer punktiert.

Thorax: Pronotom-Vorderecken verrundet bis schwach gewinkelt. die Skulptur des Pronotums besteht aus ziemlich gleichmässig groben, dicht nebeneinanderliegenden Punkten. Mesonotum, Scutellum und Metanotum sehr grob und ziemlich dicht, nur der Vorderrand des Mesonotum-Mittelfeldes feiner und dichter punktiert.

Abdomen: Von typischer *Hedychridium*-Gestalt, ziemlich flach und breit. 1. Segment an der Basis tief eingedrückt, gleichmässig dicht und ziemlich grob punktiert, nur die Oberfläche des basalen, eingebuchteten Teiles etwas schwächer punktiert. 2. Segment ebenso gleichmässig und dicht, am Hinterrande etwas gröber punktiert. 3. Segment kurz, die Skulptur wie am Hinterrande des 2. Segmentes. Ein schmaler Endsaum des 3. Segmentes ist bei allen vier Exemplaren etwas hyalin; beim ♂ ist diese hyaline Zone

etwas breiter und weist an der proximalen Grenze eine geschlossene Reihe regelmässiger kleiner Punkte auf, die jedoch nicht der "Punktreihe" der *Chrysis*-Arten entspricht, sondern lediglich das Ende der Oberflächen-Skulptur des 3. Tergites darstellt. Die nicht hyalinen Seitenränder des 3. Tergits sind fein und spärlich hell bewimpert.

Die Klauen tragen in der Mitte einen kleinen, senkrecht abstehenden Zahn.

Färbung : Mandibeln braun mit schwarzer Spitze, Fühler einschliesslich des Schaftes gelbbraun, an der Spitze dunkler, Tarsen und Tibien dunkelgelb, letztere selten mit schwach metallischem Schimmer. Kopf und Thorax dunkelgrün mit Kupferschimmer, der feinpunktierte vordere Randteil des Mesonotums manchmal blau. Abdomen ebenso dunkelgelb wie die Beine, ohne metallischem Schimmer.

Flügel glashell, Geäder stark reduziert, Diskoidal- und Radialzelle eben schwach angedeutet.

Länge : 3-4 mm. — 4 Exemplare (1 ♂ und 3 ♀).

Die neue Art erinnert wegen ihres nicht metallischen, dunkelgelben Abdomens auf den ersten Blick an *Hedychridium roseum* Rossi, steht jedoch zu ihm in keiner näheren Beziehung; durch diese Färbung des Abdomens unterscheidet sie sich von allen aus Aegypten und Afrika überhaupt bisher bekannten *Hedychridium*-Arten.

Fundort : Umgebung von Cairo (Wadi Hof, Ezbet-el-Nachl, Sakkara, leg. A. Mochi).

Typen in Coll. A. Mochi, Cairo, und Dr. St. Zimmermann, Wien.

Séance du 24 Avril 1940

Présidence de Monsieur le Professeur Docteur H. PRIESNER,
Vice-Président

Vorlæufige Mitteilung über zwei Tortriciden als Kulturschædlinge in Unteraegypten

[Microlepidoptera : Tortricidae]

(mit 1 Tafel)

von Prof. Dr. H. REBEL (Wien)

Nach Mitteilung der Herren Entomologen A. Alfieri und Prof. Dr. H. Priesner treten in Unterägypten — namentlich in der Provinz Menufia — seit einigen Jahren Tortriciden-Larven als Schädlinge in Weizenfeldern und Flachskulturen auf, die der Gattung *Cnephasia* angehören.

Schon F. C. Willcocks erwähnt in seinem Werk über die Getreideschädlinge in Ägypten (The Insect and related pest of Egypt, etc., Vol. II, 1925, p. 101 and note) unter dem Titel « A note on the causes of white ear in wheat », dass die Weissährigkeit (ausser durch andere Schädlinge) auch durch die Larve eines Wicklers (*Cnephasia*) hervorgerufen werden könne.

Materialsendungen von Imagines ergaben, dass es sich um Formen der in Südeuropa weit verbreiteten *Cnephasia pasivana* Hb. handelt.

Bei den derzeit noch unlösbaren Schwierigkeiten [1], die der taxonomischen Beurteilung mancher Art gruppen innerhalb der Gattung *Cnephasia* entgegenstehen, erscheint es zur vorläufigen Unterscheidung der vorlie-

[1] Ausserordentliche Variabilität der Imagines, Versagen des Genitalapparates zur artlichen Trennung, Polyphagie der Larven, etc. (vgl. Kennel Pal. Tortr., pp. 204-206).

genden Formen zweckdienlich, ihnen nach ihren Nährpflanzen Kennamen zu geben.

So mag die als Larve auf Weizen lebende Form als « *pyrophagana* », jene von Flachs als « *linophagana* » bezeichnet werden.

Diagnosen beider hätten zu lauten:

1. Cnephasia pyrophagana Rebel, ♂ und ♀.

Allgemeinfärbung weissgrau. Fühler bis 1/2 des Vorderrandes der Vfl. reichend, beim ♂ schwach verdickt, mit etwas abstehenden Gliederenden und sehr kurzer, schütterer Bewimperung. Die vorstehenden Labialpalpen überragen etwas die Stirne, besitzen ein gegen das Ende breiter beschupptes Mittelglied und ein sehr kurzes, nacktes, stumpfes Endglied. Sie sind durchaus hellstaubgrau gefärbt. Kopf, Thorax und Hinterleib ebenfalls staubgrau, zuweilen — namentlich beim ♀ — mit einem schwachen Stich ins Bräunliche. Die Beine weissgrau. Die Vordertarsen zuweilen (beim ♂) schwärzlichbraun gefleckt. Der zylindrische, gestreckte Hinterleib überragt mit 1/3 seiner Länge den Afterwinkel der Hfl. Seine Spitze ist mehr oder weniger ockergelblich. Er trägt beim ♂ einen kurzen, gestutzten Afterbusch, beim ♀ endet er stumpf. Der entschuppte Genitalapparat ist rötlichockergelb.

Die Vfl. (wie bei *pasivana* geformt) zeigen namentlich bei 1/3 ihrer Länge, einen stark gebogenen Vorderrand, steilen Saum und gerundeten Innenwinkel. Sie sind bei dem meist grüsseren ♂ breiter als beim ♀. Ihre Grundfarbe ist weissgrau, selten mit einem schwachen Stich ins Bräunliche. Beim ♂ sind die Vfl. meist ohne Spur einer Bindenzeichnung, nur mit schütterer grauer Bestäubung, namentlich gegen den Vorderrand. Einzelne schwarze Schuppen liegen gleichmässig verstreut auf der ganzen Flügelfläche. Oft durchzieht eine feine graue Staublinie die breiten, weissgrauen Fransen. Die Hfl. sind am Innenwinkel breiter als die Vfl., mit stumpf gerundeter Spitze. Sie sind staub- oder weissgrau, mit helleren Fransen, die nahe ihrer Basis meist eine undeutliche Teilungslinie führen.

Das kleinere ♀ mit etwas schmäleren Flügeln, zeigt auf den hellgrauen Vfl. meist eine ganz verwaschene Querbindenzeichnung, von der eine Schrägbinde nahe der Basis, eine zweite von 2/3 des Vorderrandes gegen den Innenwinkel ziehende, und eine ganz undeutliche Querbinde im Saumfeld zuweilen angedeutet sind. Auch nur graue Vorderrandsflecke können die sonst fehlende Bindenzeichnung andeuten.

Die Unterseite der Vfl. ist dunkler grau, mit helleren Fransen, jene der Hfl. wie oberseits. Vfll. ♂ 8-9, Exp. 16-18 mm., ♀ Vfll. 7-8, Exp. 14-16 mm.

Der Genitalapparat von *pyrophagana* ♂ und ♀ lässt sich mit den Abbildungen jenes von *Cnephasia pasivana* Hb. bei Pierce und Metcalfe

(Genital of Tortricidae, Liverpool, 1922, p. 11, Pl. 4, fig. 3) (ohne der Zeichnung spezifischen Wert zuzuerkennen !) vereinen.

Über die Lebensweise der *pyrophagana*-Larve wird mitgeteilt, dass sie im März-April den Weizenhalm, oberhalb dessen obersten Knoten abfrisst, auch im Halm oberhalb des obersten Knotens lebt, oder auch an den Ähren nagt.

Von südeuropäischen Stücken der *Cnephasia pasivana* Hb. unterscheidet sich diese als erwachsene Larve auf Weizen lebende *pyrophagana* durch bedeutendere Grösse der ♂, viel lichtere Färbung, die der bräunlichen Einmischung fast ganz entbehrt, ferner durch die beim ♂ meist ganz fehlende Bindenzeichnung der Vfl. und hellere, reingraue Hfl. (vgl. Taf., fig. 9 und 10).

Noch näher kommt die artlich wahrscheinlich nicht zu trennende *Cnephasia fulturata* Filipjew (i.l.) aus Andalusien und Algerien, die allerdings etwas grösser ist und einen geraden Vorderrand der Vfl. besitzt (vgl. Taf., fig. 11 und 12).

2. **Cnephasia linophagana Rebel**, ♂ und ♀

Der vorigen Form (*pyrophagana* Rebel) überaus nahe und hauptsächlich nur durch die Lebensweise als Larve in den Kapseln von Flachs (*Linum*) verschieden. Die männlichen Falter (2 defekte Stücke ohne Hinterleib) sind etwas deutlicher als *pyrophagana* Rebel ♂ mit grauen Querwellen auf den Vfl. gezeichnet, die ♀ oft dunkler grau mit entschieden deutlicherer Bindenzeichnung der Vfl., aber von gleicher Anlage wie bei *pyrophagana* Rebel ♀.

Grösse durchschnittlich geringer als jene der *pyrophagana* Rebel, was mit der endophagen Lebensweise der Larve in den Samenkapseln des Flachses zusammenhängen mag.

Die Form *linophagana* steht der Nominatform *pasivana* näher, als der grösseren, lichteren *pyrophagana*.

Die Larve von *linophagana* lebt normal erweise in den Kapseln des Leins im April. Bis 10 % der Fechsung waren 1939 in Mit Chalaf von ihr befallen. Auf Flachskulturen, deren Anbau keine örtliche Nähe zu Weizenfeldern hatte, wurde *linophagana* bisher nicht beobachtet.

Das Aussehen der Larven von *pyrophagana* und *linophagana* ist ein ganz übereinstimmendes (Priesner).

Nach Erfahrung österreichischer Mikrolepidopterologen bei der Zucht heimischer *Cnephasia*-arten, minieren die jungen Larven anfänglich in Blättern diverser niederer Pflanzen und suchen erst bei vorgeschrittenerem Wachstum geeignetere Nährpflanzen auf, um ihre Entwicklung zu vollenden. Eine zweite Generation ist nicht vorhanden.

Ähnlich dürfte auch der Lebenszyklus der ägyptischen *Cnephasia*-formen verlaufen. Die Eiablage wird wahrscheinlich im Mai an Ackerunkräuter,

vielleicht auch an vorhandene Leguminosen, erzeugen. Das Wachstum der Larven dürfte während der heissen Sommermonate bei vegetarischer Lebensweise ein sehr langsames sein; erst im Frühjahr würden die inzwischen gewachsenen Larven ihre Nährpflanze wechseln und ihre räuberische Lebensweise mit einer immer noch vorwiegend phytophagen vertauschen, um sich schliesslich im Bereiche der neuen Nährpflanzen zu verpuppen.

Als bestes Bekämpfungsmittel dürfte sich — bei Kenntnis dieser geschilderten Lebensweise — die rechtzeitige Entfernung aller im Bereiche der gefährdeten Kulturgewächse stehenden Unkräuter, Zwischenpflanzen, etc. erweisen.

Tafelerklärung

Fig. 1. — *Cnephasia pyrophagana* Rebel, ♂ : Mit Chálaf, 10.IV.1939, ex larva, on wheat.

Fig. 2. — *Cnephasia pyrophagana* Rebel, ♀ : Shoubra Zingi, on wheat, 18.IV.1935.

Fig. 3. — *Cnephasia pyrophagana* Rebel, ♀ : desgl.

Fig. 4. — *Cnephasia pyrophagana* Rebel, ♀ : on wheat, 20.IV.1939.

Fig. 5. — *Cnephasia pyrophagana* Rebel, ♂ (schmalflügelig) : Shoubra Zingi, ex larva, 27.IV.1935, on wheat.

Fig. 6. — *Cnephasia linophagana* Rebel, ♂ : éclos, 24.IV.1939, du lin.

Fig. 7. — *Cnephasia linophagana* Rebel, ♀ : Shebin El Kom, 13.IV.1939.

Fig. 8. — *Cnephasia linophagana* Rebel, ♀ : éclos, 24.IV.1939, du lin.

Fig. 9. — *Cnephasia pasivana* Hb., ♂ : Livorno, Mann 1872.

Fig. 10. — *Cnephasia pasivana* Hb., ♀ : Prater, Mann 1856.

Fig. 11. — *Cnephasia fulturata* Filipjew, ♂ : Granada, Ende Mai 1925, Zerny.

Fig. 12. — *Cnephasia fulturata* Filipjew : desgl. Zentr. Alger, Hassih Beba, Mai 1930, Schwing.

(Vergr. 2:1)

Prof. Dr H. Rebel

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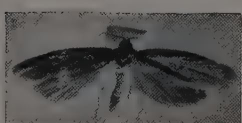

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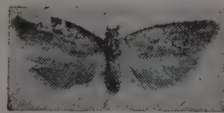

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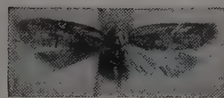

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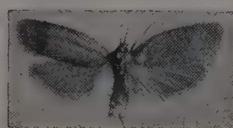

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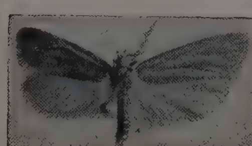

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Vorlaeufige Mitteilung über zwei Tortriciden als Kulturschaedlinge in Unteraegypten

Control of Tetranychidae (Red Spider Mites) in Egypt

[Acarina]

by Dr. M. Taher Sayed

I found Mr. Steiner's paper (Zeit. Ang. Ent., XXVI, 1, p. 180, 1939) on the control of red spider mites very interesting and it induced me to write a similar note on the Tetranychid question in Egypt. The family *Tetranychidae* is well represented in this country. The following genera are found:

Tetranychus Dufour (1832), *Anychus* Mc Gregor (1913), *Tenuipalpus* Donnadieu (1876), *Raoiella* Hirst (1924), *Petrobia* Murray (1877), *Bryobia* C.L. Koch (1836), *Phytoptipalpus* Tragardh (1904), *Tetranychopsis* Canestrini (1890), *Phyllotetranychus* T. Sayed (1938), *Dolichotetranychus* T. Sayed (1938).

Although Tragardh has recorded *Tetranychopsis* in Egypt, the writer has not seen it yet. Only four or five genera are economically important. These are represented by the following species: *Tetranychus telarius* L., *Anychus latus* C. and F. (?), *Tenuipalpus* 2 nov. spp., *Dolichotetranychus floridanus* Banks, and to less extent *Raoiella indica* Hirst.

Tetranychus telarius is the commonest red spider mite in Egypt and infests fig plantations (especially in Fayoum province), all cucurbits, leguminous plants, and other vegetables. It occasionally infests some of the main crops as cotton and clover and could be found on several ornamental trees.

Anychus latus C. and F. (?) is the main citrus mite in Egypt. It is often found on *Ricinus communis* and some ornamental trees as *Melis azedirachta*. It is probably the same as *Anychus orientalis* Zacher (see Klein, 1936). The writer's description of this mite coincides to a great extent with that of Hirst. Infested fruits have a russety appearance before they are mature. In some orchards this pest is the main one when compared with other citrus pests. Not all citrus species are equally susceptible to this mite. Sweet lemon is more susceptible than orange and mandarine. Bitter lemon is the least susceptible. *Tetranychus* and *Tenuipalpus* spp. may be found occasionally on citrus.

Tenuipalpus 2 nov. spp.: The description of these mites will appear shortly. One of these is a pest of apples, pears, plums, peaches and few

ornamental trees and shrubs. Heavy infestation gives a brownish appearance to greenish fruits, especially apples and pears. The other species infests vine leaves and those of pomegranate as well as its fruit.

Dolichotetranychus floridanus Banks is the grass (*Cynodon dactylon*) mite in Egypt. It infests as well *Ananas sativus* Lindl., *Phragmites communis* and Halfa (*Eragrostis bipinnata*). Its symptoms on grass are unmistakable. Leaves are seen short, very close to each other with a stunted appearance. The mite is seen lodged between the overlapping leaves, and usually accompanied by a black fungus which is probably carried by the mite since this fungus has not been noticed alone. It is probable as well that the susceptibility to the fungus attack is indirect. Infested grounds have very short and brownish grass especially when the attack is rather old.

The *Ananas* (pine-apples) plantation is only limited to Inchas (in the Delta) in the private Royal estate where the mite could be seen at the base of the leaves giving it dark or light brown appearance. Of all the attacks examined, no black fungus was noticed, as in the case of grass. This mite was recorded by Banks (1915) as *Stigmaeus floridanus*. The generic name had to be changed since the *Stigmaeus* characters are entirely different.

Raoiella indica Hirst is a coconut pest in India but a date-palm one in Egypt. It has been seen infesting palm leaves while *Oligotetranychus* (*Paratetranychus simplex*) in Iraq and Algeria infests inflorescences and small green dates. The mite seems to be a more serious pest in the Sudan than in Egypt. Leaves, when heavily infested, look brown and rusty.

Methods of Control

Chemicals used against Tetranychids in Egypt are :

(1) Sulphur dust : Reduces the attack considerably but is less toxic to the egg which might hatch after dusting. Hence, another application would be sometimes necessary a week after the first to ensure its effect on the newly hatching larvae.

Dusting should be only applied early in the morning when the dew is present. If this is not available, artificial dew, i.e. slight spraying with ordinary water would be necessary just before dusting. The fact that rain is scarce in Egypt is helpful against washing off the dust. Sulphur is preferably used with tender foliage as in flowers, vine leaves, vegetables, etc. It has been found that rather heavy dusting, when the weather is very hot by day, may cause scorching to the vine-leaves. This occurred in a sandy soil near Alexandria but only to one particular variety. Again, heavy dusting on small watermelon fruits might scorch them when exposed to very hot sun during the day. Other sulphur dusting compounds are available on the market but the proportion of sulphur in these is rather low, and moreover their usual dark

appearance, due to iron compounds or dark carriers might affect photosynthesis.

(2) Lime-sulphur : Although very much used in Egypt and other parts of the world, it is not thoroughly investigated. Several ways of preparation are recorded in the literature. It is usually prepared in Egypt in the following ratio : one kilo quicklime : two kilos sulphur : twelve litres water. This ratio does not as a rule give more than 20° Baumé. It was found that when only 6.5 litres of water are used instead of twelve, the Baumé may rise up to 34°. In the Oregon experimental station lime-sulphur is prepared in the ratio : quicklime (stone lime) 50 pounds : sulphur powdered 100 pounds : water 50 gallons.

In other words the ratio is 1 : 2 : 8,5 (approximately). The Baumé of this preparation is bound to be over 20°. However, the ratio of lime to sulphur is occasionally reversed, as recorded by Bourcart. The formula is as follows :

22 lbs quicklime, 11 lbs flowers of sulphur and 22 gallons of water.

The addition of 2.2 gallons crude glycerine is recommended to decrease the scorching effect of the spray but this has not yet been tried. It is necessary to determine the amount of polysulphides or the effective ingredient in each of the different recommended preparations. Dilution is relative to the Baumé degrees, specific gravity, the weather and the plants, whether they are dormant or not.

It is extremely important to use quick or stone lime, and it is always advisable to assume about 10 % impurities in the lime and hance, use more than recommended or else, a great amount of sludge is formed and sulphur is wasted.

Lime-sulphur when tried on citrus, vine, and other plants does not spread as it should, and therefore, the addition of a spreader seems to be necessary.

The following spreaders (some of shich are also stickers) were found useful.

(a) Flour-paste : Only wheat flour is used because it is more gelatinous ; one pound of flour to four litres of water. This is heated and stirred continuously till the mixture thickens and becomes sticky. It is used 4 % when mixed with lime-sulphur. If the lime-sulphur dilution is 1 %, the formula would be as follows :

1 liter lime-sulphur, 4 litres flour-paste, and 95 litres water.

Flour-paste has been tried by itself as acaricide with a double proportion, namely 8 %, but it was not successful.

(b) Casein : Only 70 grams to each 100 litres spray were found sufficient. The distribution of lime-sulphur was even, and the foliage seemed deeper green when compared with that treated with other spreaders.

(c) Arabic gum or gelatine : 415 grams to 100 litres spray.

(d) Agaral (Imperial Chemical Industries compound) : 200 c.c. in 100 litres spray.

(e) Fenugreek flour (*Trigonella foenum-graecum*) : 300 grams for 100 litres. The fenugreek seeds are first roasted and then ground.

Scorching of citrus fruits when sprayed by lime-sulphur in summer occurs sometimes when least expected. Agricultural conditions and variety of fruit seem to be important factors. Navel oranges seemed to be more susceptible than other varieties to scorching.

(3) Sodium sulphide : Proved to be an excellent dormant spray when used against *Tenuipalpus* on apples, pears and plums. It was prepared in the following ratio :

Caustic soda 13.5 kilos, sulphur 20 kilos, water (warm) 12.5 gallons.

It was quite effective when used at 5% in winter, and it is probable that it could be effective in a low concentration. When used with flour-paste as in the case of lime-sulphur, the spreading would be ensured. Summer concentrations have not yet been tried.

(4) Potassium sulphide : This has been already used as acaricide by Massee of the East Malling Experimental Station, England. When tried here, 63 grams with 1/2 lb. of soap to each 100 litres, the result was not satisfactory.

(5) Sulphate of nicotine + soap: This is so far an ideal insecticide for aphis, but it is certainly less toxic against mites especially when compared with oil emulsions or lime sulphur. When fish oil soap, instead of the ordinary washing soap is used, better result is attained.

(6) Oil emulsions: Several oil emulsions were used of which the mineral oil emulsions proved to be the best. The Ministry of Agriculture oil emulsion "Nan" as prepared by Dr. Moh. Shafik is an excellent acaricide when used at 1%. The American Volk is also good, provided it is fresh and well emulsified. In some cases, there was scorching as a result of separation.

Oil emulsions are more safely used in summer, especially on citrus, when sulphur compounds are liable to scorch the fruits on a very hot day.

This is only a general survey of acaricides tried by the Entomological Section, Ministry of Agriculture, in Egypt; but there is a good example in which any direct chemical acaricide fails. It is *Dolichotetranychus floridanus* which infests the grass *Cynodon dactylon* in Egypt. The mite is lodged between the leaves of the tightly overlapping leaves. It recently caused considerable damage in the sporting clubs at Maadi, Gezirah and other places near Cairo. Dusting with flowers of sulphur, spraying with lime-sulphur and oil emulsions were tried but in vain. It was noticed that grass growing in a poor soil is more susceptible to the attack. Only agricultural methods could in

this case succeed. In Maadi, the growing part of the grass above the ground was shaved so as to remove the infested portion, and then destroyed. Different manures were added to different plots of the ground which is almost pure sand. Best results were attained in the plots where stable manure + ammonium sulphate were applied. It was also found that the deficiency of clay accounts much for the attack, although the mite also occurs in the clay ground of the Ministry of Agriculture.

As to its control on Ananas, this has not yet been tackled; but it seems that dusting or spraying the plants from the tops (so that the chemicals could reach the leaf-bases) would give results.

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Séance du 29 Mai 1940

Présidence de Monsieur le Professeur H. C. Efflatoun Bey,
Vice-Président

On some Thysanoptera *(Thripidae)* from Palestine and Cyprus

(with 1 Illustration)

by Prof. Dr. H. Priesner

1. Oxythrips uncinatus spec. nov.

Female : Brown to dark brown, legs dark, fore tibiae cloudily shaded, tarsi yellowish; joints 1, 2, and 4-8 dark, 3 yellowish, more or less strongly shaded, pedicel yellow ; joint 4 sometimes paler at extreme base ; wings shaded with a more or less pale grey or grey-brown ; major bristles of the body dark ; ocellar pigment red.

Head length from eyes 102 (total length 110-114), eyes 55 μ ; cheeks 47-51 μ long, slightly convex, head somewhat broader across cheeks (142 μ) than across eyes (130 μ) ; vertex with anastomosing cross-wrinkles which lie not very dense ; four small postocular microsetae situated in an oblique line on either side behind eyes ; hind ocelli about 24 μ distant from each other ; *interocellars small*, 20 μ not surpassing in length ; mouth-cone well developed, reaching mesosternum ; maxillary palpi slender, joints 20, 11 and 17 μ long. Antennae length about 260 μ ; measurements of joints (of holotype) in μ : 22(29), 39(26), 45(20), 41(20), 36(22+), 43(20-21), 8(8-8.5), 14-15 (5) ; joints normal, 5 with sides much convex, the longer sense-cone of joint 6 reaching middle of the following joint ; style *moderately* slender.

Pronotum, length 118 μ in holotype (106 in other specimens), width 185 μ, distinctly widened towards base, sides little arched, disk with ca. 20 pairs of microsetae, apart from the 5 pairs of the fore margin, the four pairs of inner postero-marginals, and the 1 situated by the long postero-angulars ; the latter measure 35-47 μ ; *fore tarsi with a claw at extreme apex*, which

is very distinctly developed (Fig. 1), and much longer and more conspicuous than in *Oxythrips ajugae* Uz.

Pterothorax width 250, length (from fore margin to base of hind coxae) 260-268 μ; inner bristles of base of metascutum (I) far apart from fore margin of it, shorter (20 μ) than the lateral setae (24-28 μ) which are situated at the fore margin; metascutum (I) coarsely but faintly reticulated medianly; wings (length 709-840 μ) moderately broad, veins visible; costa with well 30, upper vein with 4+3 basal and 1+2 *small* distal bristles, lower

Fig. 1. — *Oxythrips uncinatus* spec. nov.: Fore tibia and fore tarsus of the female.

vein with 10-13 (mostly 13) bristles which distinctly increase in length towards tip of wing; scale with 5(6)+1 bristles.

Tergite II of the abdomen *at lateral margin with but 2 bristles*, one of which is situated about the middle of the lateral margin, the other one at hind angles; there is only a porus about fore angles but no bristle nor microseta. Porus on tergite VIII on a plane between the dorsal bristles and the hind margin; comb wanting; accessory sternite bristles wanting. Dorsal bristles on segment IX vestigial (reduced to microsetae), those of hind margin

b.1,2 : 91-99, b.3 75 μ long; bristles on segment X, b.1 : 75, b.2 : 63-67 μ long. Length of segment IX, 77-80, of X, 63 μ; ovipositor length about 256 μ. Hind tibiae with 7-8 bristles at inner margin (beside the apical spurs). — Total body length (normally distended) 1.16 to (distended) 1.44 mm.

Habitat: Palestine, a few females, collected by Dr. E. Rivnay at Caduri Tabor, on 20.4.38, on oak (*Quercus*) leaves; 2 females from the same locality, 11.3.38, from buds of *Quercus*.

Among the species armed with a tarsal tooth, in *Oxythrips ajugae* Uz. the tooth is, though homologous, much shorter and less slender, and therefore less conspicuous, besides, *Oxythrips ajugae* is a less slender species and coloured differently (either yellow or, head and thorax orange, abdomen brown); *Oxythrips flavus* Moris. has prothoracic setae much longer (72 μ), apart from its different colour; *Oxythrips dentatus* Kn. (see below) has longer, tubiform abdominal segment X, and has the tarsal tooth stouter and situated at apex of first tarsal joint and not at apex of bladder, and so on.

2. Oxythrips claripennis spec. nov.

A typical *Oxythrips*. — Among the unarmed species, differing from *euxinus* Kn. by the hyaline wings, the longer postero-angulars of the prothorax, and the greater number of lower vein bristles; *forticornis* Bagn. is a much tenderer species, as it appears from the measurements of the antennae, moreover, it has the mouth-cone longer and more pointed, and but 8-9 lower vein bristles; of *halidayi* Bgn., a macropterous form is not known yet, this species has however, in any case, much darker antennae; *inopinatus* Pr, has antennae slenderer, and the whole body is much less compact; *tamaricis* Bagn. is similar in shape but postero-angulars of pronotum are much shorter, wings shaded towards tip, and the minute but dark lower vein bristles are less in number; *pernicis* Bgn. is a smaller form, though not sufficiently described; *quercicola* Bagn., a pale species, has dark wing bristles, colourless joint 1 and pale joint 2 of the antennae, slightly shaded wings, but may be similar in the shape of the antennal joints; *tristis* Bgn. has antennal 6 shorter, and only 8 lower vein bristles, whilst its wings are similar to those of *tamaricis*, in colour; dark specimens of *ulmifoliorum* Hal. which finally might be compared with *claripennis* n.sp., have their interocellar setae vestigial.

The new species is particularly recognizeable by its dark colour combined with the wholly hyaline wings and pale wing setae; its habitus is about that of *tamaricis* Bagn.

Female: Dark brown, abdomen nearly black-brown, thorax somewhat lighter, hind marginal line of vertex blackish. Legs dark, fore tibiae yellow from the middle towards apex; at margins, the dark colour extends farther towards apex of tibia than interiorly; middle and hind tibiae yellowish at

extreme tips; tarsi yellowish. Antennal joints 1, 2 and 6 to 8 wholly dark (dark grey-brown to black-brown), joints 3-5 paler, 3 and 4 with uniformly greyish shade (i.e. not clear yellow), 5 yellow but basally or in basal third, the rest strongly shaded with grey-brown. All major bristles of the body dark. Wings wholly hyaline (not yellowish), bristles pale or very slightly shaded.

Head broader than long, broader across cheeks than across eyes, cheeks slightly rounded, vertex cross-wrinkelled above, and therefore *slightly* serrate laterally; interocellar setae situated on or just outside the "tangent", very well developed, surpassing the hind ocelli; postocular series of micro-setae somewhat irregular (3 + 1); two pairs of ante-ocellars well visible, one situated at inner margin of eyes on the same plane as the front ocellus, the other in front of this plane, with the inter-ocellars in one longitudinal line; micro-setae between the ommatidia inconspicuous. Antennae moderately long, joint 1 short, with strongly rounded sides, 2 normal, 3 pedicelled, much widened towards apex; sense-cones normal, strongly curved; micro-setulae of intermediate antennal joints distinct; joint 5 much rounded at sides, 6, though slender basally, not constricted, its major sense-cone moderately long, not reaching tip of antenna; joint 8 much longer than 7, style, therefore, slender. Mouth-cone short.

Prothorax of very moderate size, in comparison with head, sides little rounded; fore margin with 4-5 pairs of micro-setae, disk with about 10 pairs, hind margin with 3-4 (normally 4) inner and 2 outer pairs of micro-setae which are separated by one macro-seta (postero-angular bristle) of 39-47 μ.

The median of the two pairs of setae on the metascutum is somewhat longer than the outer, and somewhat distant from base. Wing bristles almost as clear as the wings themselves, or but slightly shaded, veins clear but distinctly visible, costa with about 30, upper vein with 4 + 3 (4,5) basal, and 1 + 1 + 1 distal, lower vein with 11-13 bristles.

Tergite VIII with its pores situated in the space between the dorsal bristles and the hind margin; comb wanting; accessory sternite bristles wanting; segment X split above nearly down to its base. Bristles at hind margin of segment IX strong, the dorsals weak (about 14 μ).

M e a s u r e m e n t s (of holotype) in μ: Head length from eyes 110, total length 122, width across eyes 144, across cheeks 150; eyes diameter 51-55; cheeks behind eyes 63; inter-ocellar bristles 28-32; inner distance of hind ocelli 32; antennae total length 243; joints 17 (29), 36-39 (27), 42-45 (22), 38-39 (22), 34-35 (22), 46-48 (20), 9.5-10 (8), 15-17 (5-6). Prothorax length 114, width 173; postero-angular bristles length 39-47. Pterothorax width 230-245; wings length 623-692 (several specimens), width behind scale 77-79. Abdomen, segment II length 70, segment IX length 63; bristles on segment IX, b. 1-3, 87-102; bristles on segment X, b. 1 75, b. 2 59-63; ovipositor length 188-193.

Total body length (normal length to slightly distended) : 1.04-1.23 mm.

Habitat: Cyprus, Amathus, 2.2.40, collected by Mr. G. A. Mavromoustakis (N° 40/2) on an unidentified shrub (4 specimens).

3. Oxythrips eryngii spec. nov.

Female (f. macroptera) : Body light brown to orange-brown in front, abdomen dark brown. Antennal joints 5-8 dark, as dark as the abdomen, 5 light at pedicel, joints 1-4 much paler, 3 yellow, 1, 2 and 4 more or less slightly shaded with grey. Legs pale yellow, fore femora at outer margin. middle and hind femora at both margins shaded with grey, middle and hind tibiae mostly with pale greyish ring, or the hind tibiae very slightly shaded at exterior margin ; tarsi pale yellow. Wings uniformly pale yellowish. Major body and wing bristles dark. Ocellar pigment orange.

Head large, moderately transverse, cheeks somewhat longer than eyes, vertex slightly transversely striate, interocellar bristles well developed, distinctly surpassing hind ocelli and inserted in or somewhat inside tangent ; ante-ocellars arranged in a shallow arc, the lateral ones on the same plane as the front ocellus, the middle ones somewhat in front ; the series of postocular micro-setae consists of about 3 pairs, the innermost of which being inserted far apart from the hind ocelli. Antennae similar to those of *claripennis*, style slender, but joints 5 and 6 somewhat pedicelled at base, whilst in *claripennis*, joint 6 is broader at base. Mouth-cone normal, maxillary palpi of moderate length.

Prothorax, in comparison with head of moderate size, scarcely narrowed anteriorly, disk with only about 13 pairs of micro-setae, fore margin with 6(7) pairs, hind margin with 3-4 pairs inner and two outer micro-setae, and one postero-angular between them, the latter measuring 43-47 μ in the f. macroptera (33-37 μ in f. brachyptera). Fore tarsi unarmed.

Pterothorax normal, metascutum with indistinct net-like structure, medianly ; the central pair of bristles on the metascutum, situated in the middle of this segment, rather light, tender, somewhat larger than the lateral pair, which is situated at the fore margin. *Wings much varying in length*, and therefore also in the number of bristles on their veins ; these bristles are dark, much longer towards tip than at base ; in the holotype, costa with 24, the upper vein with 4+2(3) basal, and 1+2 distal bristles ; 12 bristles on the lower vein and 5 on the suture of the scale ; in another specimen, only 18 costal bristles are present, with 4+3 basal and 1+1 distal upper vein bristles, and 7 lower vein bristles (with 5 on the scale suture).

Tergite I of the abdomen with pori very close to hind margin ; tergite II with but two lateral bristles ; tergite VIII without comb, its pori scarcely behind a cross-line on which dorsal bristles 1 and 2 are situated ; accessory

sternite bristles wanting. Bristles on hind margin of segment IX, strong, dark. Base of segment X split nearly down to its base.

Measurements (of holotype) in μ: Head length from eyes 110, total length 122, width across eyes 128-136, across cheeks 138-146; eyes diameter 55-59; cheeks length behind eyes 59-63; inner distance of hind ocelli 28-30; antennae total 234-242; joints, ? (27), 36 (26-27), 39-41 (19-20), 34 (18-20), 31-32 (17-18), 42 (18-19), 8 (6-7), 14 (4-5); inter-ocellar bristles length 28-30. Pronotum length 122, breadth 173; postero-angular bristles 43-47. Median bristles on metascutum 16-18; pterothorax breadth 200-235, length 173-200; wings length 675 (of paratype 520). Abdominal segment IX length 63, segment X 61-71; bristles 1-3 of segment IX 106-118, b.1 of segment X 95-99, b.2 83.— Ovipositor 200-205 μ long.

Female (f. brachyptera): Colour similar, but sometimes head and thorax more strongly shaded so that they do not contrast so much with the abdomen as it is the case in the typical specimens. Wing pads 165-210 μ long. with 1+7 (8) costal, 6-8 longitudinal (upper) vein, and 5 sutural (scale) bristles, and sometimes, in addition, 3 lower vein bristles; veins indistinct. Bristles on segment IX 95-102, those on hind angles of prothorax 33-37 μ long.

Habitat: A few females were taken by Dr. E. Rivnay, 20.3.36, on *Eryngium creticum* at Gedera, Palestine.

This species differs from *ajugae* Uz., which is similar in colour, and *pernicis* Bgn. by the lack of the tarsal tooth, from *euxinus* Kn. and *forticornis* Bgn. by the longer bristles on pronotum and abdomen (of the macropterous form), from the latter also by the normal mouth-cone: *quercicola* Bgn. has antennal joint 1 pale, abdomen but with transversal shadings on the tergites, and the bristles on segment IX are much shorter; of *halidayi* Bgn., there exists a brachypterous form in which, however, antennal 1 and the whole body are much darker, and the postero-angulars of the pronotum are much longer (53 μ); *tristis* Bgn. has dark tibiae and much darker antennae, the wings are shaded towards tip, but it agrees with the new species in having joint 6 of the antennae constricted at base; in *tristis*, the postero-angulars of the pronotum are much shorter; *claripennis* Pr. is similar but has uniformly coloured body, base of antennae much darker, and joint 6 much thicker at base, not pedicelled (as joint 5) but only narrowed; wings and also their bristles are hyaline, in *claripennis*.

Pseudoxythrips subgen. nov.

As *Oxythrips* s.str., but fore tarsi within, at tip of joint 1 with a conspicuous tooth, both veins of fore wing for all their length rather evenly set with bristles. The single macro-seta at hind angles of pronotum comparatively short. Branches of forked sense-cones rather straight. Fore femora somewhat enlarged, apex somewhat turned up exteriorly.

Typus subgen.: *Oxythrips dentatus* Knechtel.

From *Pseudothrips* Hinds (typ. gen. *Ps. inaequalis* Beach), the new subgenus of *Oxythrips* is distinguished by the presence of the tarsal tooth, and in the position of the bristles 1 of the tergites, which are widely separated and very small, whilst they are close together on the anterior tergites, in *Pseudothrips*.

4. Oxythrips dentatus Kn. var. umbraticornis nov.

Female: Dark brown, fore tibiae pale in the middle, longitudinally, much shaded at both margins, fore tarsi pale yellow, middle and hind tarsi grey-yellow to yellow-grey; antennae dark brown, joint 4 not or only slightly lighter brown, 3 yellowish grey-brown, extreme base pale yellow; 2 somewhat paler at tip; major body bristles dark; wings strongly shaded all over, with oval hyaline areola before base of lower vein.

Head moderately large, with large eyes which are, however, laterally not at all convex, cheeks straight (or perhaps very slightly narrowed towards base), eyes scarcely pilose; vertex slightly cross-lined; posterior ocelli situated about the posterior third of eyes; inter-ocellar setae *small* (about 16 μ), far behind, in or somewhat behind a line across hind margin of posterior ocelli, close to each other (distance 11-12 μ); post-ocular series of micro-setae consisting of five dorsals reaching the inter-ocellars, in an uninterrupted arc, close to eyes; two pairs of ante-ocellar setae in front of eyes, a third pair close to inner margin of eyes, on the same plane as the front ocellus. Mouth-cone short, maxillary palpi moderately long, 3-jointed, joint 2 about as long as broad. Antennae short, sides of joint 1 convex, joint 3 with slender pedicel, joints 3-5 with rather distinct ringlets, *the forked sense-cones short, their branches scarcely bent,* like a pair of compasses, not crescent-shaped; intermediate antennal joints strongly convex laterally, 5 much constricted apically, 6 fusiform, thin at base, but not pedicelled; joint 2 of style much longer and slenderer than joint 1; major sense-cone on joint 6 not more than 14 μ long, reaching or somewhat surpassing the middle of joint 7. Prothorax strongly transverse, sides slightly narrowed anteriorly, disc not distinctly sculptured, with about 15 pairs of discal miscro-setae, besides, with 5 pairs of antero-marginal and 4 inner and 2 outer pairs of postero-marginal micro-setae, 1 pair of 22-24 μ long postero-angulars which are darker than all other postero-marginal bristles; fore femora enlarged, the exterior apical margin somewhat turned up, fore tibiae stout, fore tarsi with a strong tooth at apex of inner margin (not at tip of bladder). Mesonotum very faintly transversely striate, *metascutum (I) longitudinally striate,* the two pairs of bristles near base of about equal length. Wings broad, veins conspicuous, costa with about 26 setae (short at base, longer towards tip of wing), upper vein with a series

of 15-16 (4+11 or 4+12), lower vein with 11 setae; the distances of the setae on upper vein are not always quite regular. Dorsal bristles of tergites of abdomen very small, b.1 widely separated, longer on tergite VIII; on the latter tergite, the micro-pores are situated between b.1 and the hind margin, a little nearer to the latter; hind margin of tergite VIII slightly undulated, without comb; sternites without accessory bristles; postero-marginal bristle of sternite VII at a greater distance from hind margin than the other marginal bristles of this sternite; dorsal bristles on tergite IX small, the others long, particularly b.3; b.1 on segment X longer than b. 1 or 2 of segment IX; segment X moderately elongate (about as in *Thrips hukkineni*), perhaps shorter than in the typical *dentatus*, split above for nearly its entire length. Series of bristles at inner margin of hind tibiae consisting of only about 5-6, the two terminal spurs stout, dark.

Measurements (of holotype) in μ: Head length 106, total 114, width across eyes 128-130, across cheeks 138; distance of posterior ocelli 24; eyes, lateral diameter 55-59, dorsal diameter 59-63; inter-ocellar bristles about 16; antennae, total length 225-235; measurements of joints 20(25), 34(25), 38-39 [1] (20), 35(20, 29(19), 42-43(18), 7(7), 13-14(5). Pronotum length 120, breadth 185; postero-angular bristles length 22-24, median bristles on metascutum length 22; pterothorax breadth 250, length 277; wings length 760, width behind scale 70. Lengths of abdominal segments, II 73,VIII 73, IX 55, X 87; dorsal bristles on segment IX 16-18, postero-marginal b.1 79-91, b.2 93, b.3 114-122; b.1 of segment X 118, b.2 106-115; distance of b.1 of segment X from apex of this segment 36. Ovipositor length 210. — Total body length (much distended) : 1.46 mm.

Male : Colour as in female, smaller; most of morphological characters the same. Sternites III-VI (six) with dot-like glandular areas, measuring e.g., 28(16), 22(16), 24(14), 20(12) μ; lateral bristles on segment IX 67 μ long, the more strongly curved bristles of segment X 87-91 μ long; tergite IX with three pairs of rigid bristles which however cannot be called spines, the 2nd pair of which is 28-32 μ long, and its elements are close together. — Measurements in μ : Head length from eyes 100, total 106, breadth 130; antennae, 20, 31-32, 39, 34, 28, 41-42, 8, 13; maxillary palpi 11, 6. 11. Length of fore tibiae 90.

Habitat : 1 female (holotype), Palestine, Ein Harod, 23.3.36, on *Trifolium purpureum;* males and females, Safed, 16.4.36, in flowers of *Matricaria* spec.; female, Nahalal (without date), in Composite flower; 1 female, Benjamina, 24.3.36, on *Anthemis;* males and females, Beit Kerem, 30.3.36, on *Anthemis;* a few males, Zichron Yakouv, 22.2.38, on *Allium*.

I have given a more detailed description of this form, as I am not

(1) Lengths of joints varying from 36-46 μ, and 35-41 μ, respectively.

certain whether it represents the winter form of *O. dentatus* Knechtel or it is a distinct species. The differences are slight. The head, as well as the bristles of the pronotum of *O. dentatus* Kn., as figured on pl. IX (Thysanoptere din Romania, 1923), are no doubt much shorter in nature; though I have seen the type some fifteen years ago, I naturally can no more recollect any details, but I believe that the last abdominal segment is only slightly longer in *dentatus* than in *umbraticornis*. The only unquestionable difference between the two forms consists in the colour of the antennae, which is much paler in *dentatus*, with joint 3 yellow, joint 4 shaded but in distal third, *and joint 5 yellow about middle, dark at base and apex.*

In any case, even if the form *umbraticornis* will remain in our system only a variety (winter form) of *dentatus*, the more elaborate description given above — as such is usually not done in case of varieties — may be taken as emendation of the somewhat antiquated descriptions, given by Knechtel (l.c., p. 118) and myself (Thys. Eur., 1926, p. 211).

Peladothrips gen. nov. (2)

Body and legs slender. Head longish, not produced in front, eyes bulging, coarsely facetted, strongly pilose. Antennae 7-jointed, as in *Thrips* L. No prominent or additional ante-ocellar setae, no *posterior* occipital setae, but the anterior post-ocular series of micro-setae present. Maxillary palpi 3-jointed (in some cases, as in *Thrips* L., suture between joints 2 and 3 indistinct). Prothorax with two pairs of *long* postero-angular bristles, disc with conspicuous, somewhat erect micro-setae. Fore tibiae unarmed, *fore tarsi with two distinct hooks, side by side, at apex of tarsal joint 1 within.* Metascutum (I) longitudinally striate, not reticulate. Both veins of fore wing regularly set with bristles (as in *Frankliniella*), suture of scale with 5 bristles. Legs with somewhat raised setae. Abdomen normal.

Male unknown.

Typus generis : *Peladothrips biunculatus* sp. nov.

Near *Mecothrips* Karny, *Isoneurothrips* Bagn., and *Thrips* L. (Sbg. *Isothrips* m.). Differing from *Mecothrips* by the normally arranged interocellar bristles and the regular rows of wing bristles, from *Euchaetothrips* by the absence of long hairs on the tibiae and on the sides of the prothorax. and also by the chaetotaxy of the wings, from the subgenus *Isothrips* nov. (3) of

(2) ὁ, ἡ πέλας = the neighbour.

(3) In the subgenus *Isothrips* (of *Thrips* L.) (typ. subg. *Isoneurothrips orientalis* Bgn.) I include those species of *Thrips* (s.str.) in which the series of wing bristles is fairly regular and uninterrupted (more or less), as in *I. orientalis* Bgn. which is not a true *Isoneurothrips* Bgn. (typ. gen. *Ison. australis* Bagn.), the latter genus distinguished from *Thrips* L. by the closely spaced and shorter wing bristles and the presence of regularly 6 bristles at the scale-suture of the fore wing.

Thrips L. by the entirely regular rows of bristles of the veins of the fore wings, and the presence on the fore tarsi of a pair of curved teeth; *Isoneurothrips* is, apart from the last named character, generically distinguished by the presence of six setae at the suture of the wing scale. One might consider *Peladothrips* as a subgenus of *Thrips* L., but in this case, *Stenothrips* Uz. (1895) would have to be treated alike a genus which is more closely related to *Thrips* than is *Peladothrips*.

5. Peladothrips biunculatus spec. nov.

Female: Dark brown, legs dark, fore tibiae lighter about distal half (dull yellow), tarsi yellow, more or less slightly shaded with grey; antennae dark, joint 3 pale yellow, 4 darker, yellowish grey-brown, 5-7 dark, 5 somewhat lighter than 6, 4 and 5 with white ring immediately before base. Body bristles moderately dark, or slightly shaded. Wings shaded with grey-brown throughout their length.

Head appearing longish, as long as broad, *constricted* between eyes and cheeks, the former bulging, the latter convex, facets of eyes large, and setulae between them rather unusually conspicuous; hind ocelli situated about the posterior quarter of eyes, inter-ocellar setae distinct, moderately long, at the sides of the front ocellus, somewhat outside the "tangent"; 1 pair of ante-ocellar bristles present at inner margins of eyes, somewhat before their middle, and being of about the same length as the inter-ocellars. Vertex slightly transversely striate; behind eyes, a series of post-ocular micro-setae, consisting of about 7 (5 dorsally, 2 laterally) elements; the post-oculars proper are wanting. Mouth-cone normal, maxillary palpi slender, 3-jointed, joint 3 somewhat thickened at base so that the suture between joints 2 and 3 sometimes appears somewhat obsolete. Antennae slender, intermediate joints long, also joint 1 rather elongate, 3 with white membraneous sub-basal ring behind pedicel, not constricted before apex, sense-cones forked, slender, moderately long; joint 5 but slightly narrowed before tip, and therefore fairly broad, apically; joint 6 neither constricted nor pediceled basally, the major sense-cone of it little surpassing apex of joint; style moderately long, broad at base. Prothorax slightly narrowed towards apex, with a rather fine furrow just within hind margin; postero-angular bristles long, hind margin with 3-4 pairs of smaller setae within; disc set with comparatively conspicuous somewhat erect setae, of which 5 or 6 occupy the fore margin, 14-16 pairs the disc itself. Fore legs rather stout, femora and tibiae set with moderately long, semi-erect setae; fore tarsi slender, with two curved teeth side by side at apex within (not at apex of bladder), and with two small setae between base and apex of joint 1 within, emerging from rather fine tubercles which are but visible when viewed from the side. Metascutum (1) densely longitudinally striate, *not* reticulated, its median pair of setae a little apart

from fore margin, whilst the other, lateral, pair emerges from the fore margin. Wings long, very moderately broad, bristles long; costa with about 30, upper vein with 19-20 throughout its length, lower vein with the same number of bristles; the fore wing appears to be somewhat paler longitudinally, between the veins; scale at its suture with 5 (rarely 6) bristles. Sides of tergite II of the abdomen with 3 bristles, b.2 of the dorsal bristles of this tergite very close to the lateral margin (and therefore close to b.1 of the lateral margin); tergite VIII with complete comb; pori situated in the middle between b.1 and hind margin; sternites without accessory bristles; b.1 of those of hind margin of sternite VII far apart from the margin, even b.2 a little distant from it; bristles on segment IX well developed, normal; segment X split above towards basal third (or more), but often connected about the bases of bristles 1. Hind tibiae within, almost throughout their length, with 12 yellow bristles, beside their spurs.

Measurements (of holotype), in μ : Head length (from eyes) 138, total length 150, width across eyes 150, across cheeks 144-146; lateral diameter of eyes 71-79; interior distance of hind ocelli 32; inter-ocellar bristles length 24-28; maxillary palpi 11-13, 11-13, 18-20; fore tibiae length 140; antennae length 320-330; joints, 31-34 (b.31, about 28), 49-50(27-28), 66(20), 55(21), 45-46(18), 59(22), 21(10); pronotum length 150, breadth about 197; postero-angular bristles, exteriors 79-83, interiors 83-87; pterothorax breadth 260-277, length 310; dorsal bristles on segment IX of abdomen 43-47, marginals (b. 1-3) 118-122, 126-130, 142; bristles on segment X, b.1 126-134, b.2 122; segments VIII-X length, 102, 63 and 63 respectively. Wings length 934, breadth behind scale 80. Ovipositor length 230. — Total body length (distended) : 1.49-1.59 mm.

Male unknown.

Habitat : Palestine, Zichron Yakouv, 22.2.1938, females in numbers in the flowers of *Silene atocion;* one female each, on the same date and at the same locality, but in 1932, in flowers of *Cyclamen* spec., *Silene* spec. and *Senecio vernalis.*

Séance du 12 Juin 1940

Présidence de Monsieur le Docteur SAADALLAH MOHAMED MADWAR

Subventions :

Grâce aux démarches entreprises par notre Président, Monsieur le Professeur MAHMOUD TEWFIK HIFNAOUI Bey, la SOCIÉTÉ ROYALE D'AGRICULTURE nous a octroyé une subvention annuelle de L.Eg. 50, et l'IMPERIAL CHEMICAL INDUSTRIES (EGYPT) S.A. une subvention annuelle de L.Eg. 25.

La Société remercie Son Altesse le Prince OMAR TOUSSOUN, Président de la Société Royale d'Agriculture, et Monsieur STENER VOGT, Directeur de l'Imperial Chemical Industries, pour leur généreuse contribution au développement de notre Société.

Dons à la Bibliothèque :

La Société a reçu les ouvrages qui suivent :

1° De Monsieur ANDRÉ JANSSENS, de Bruxelles (Belgique) : un exemplaire de sa « Monographie des *Scarabaeus* et genres voisins », publiée dans les Mémoires du Musée Royal d'Histoire Naturelle de Belgique, 2e Série, fasc. 16, pp. 1-82 et 3 planches, Bruxelles, 1940.

2° De Monsieur PETER W. WYGODZINSKY, de Bâle (Suisse) : un tirage à part de ses deux récents travaux (a) “ Eine *Maindronia* (Lepismatidae Thysanura) aus Südamerika », (b) « Beiträge zur Kenntnis der Dipluren und Thysanuren der Schweiz », publiés dans les Verhandlungen der Naturforschenden Gesellschaft in Basel, Vol. LI, pp. 25-28 et 40-64 respectivement. Bâle, 1940.

3° De Monsieur G. A. MAVROMOUSTAKIS, de Limassol (Chypre) : un separata de ses trois récentes études des Anthidiinae (Hymenoptera-Apoidea) africaines et asiatiques, publiées dans les Annals and Magazine of Natural History, Ser. 10, Vol. XVII, pp. 31-47 et 600-607, 1936, et Ser. 10, vol. XIX, pp. 151-157, 1937 respectivement.

Le Conseil remercie les généreux donateurs.

Dons de Planches murales :

La Société a reçu les planches murales en trichromie, d'une parfaite éxécution, des sujets ci-dessous mentionnés :

1° Courtilière [don ANTOINE CASSAB].

2° Coccinelles (*Epilachna chrysomelina* et *Coccinella 11-punctata*) [don BOUTROS LABIB SOLIMAN].

3° Bruchides des fèves, lentilles, haricots et pois chiches [don RIZK ATTIA].

Le Conseil remercie.

Notes on Parasites and Predators of Coccidae and Aleurodidae in Egypt

by Prof. Dr. H. PRIESNER
and
MAHMOUD HOSNY, D.I.C., F.E.S.

For several years we have been collecting and rearing scale insect and white fly material, with a view of obtaining some knowledge on the insects parasitizing, or feeding on, the *Coccidae* and *Aleurodidae* of this country.

The material obtained, for the most part consisting of parasitic Hymenoptera, had to be sent to specialists for identification, and various authorities, particularly on *Chalcidoidea*, were kind enough to study the parasites in question. We are, therefore, much indebted to Dr. S. Novicky (Thorn) and Dr. H. Compere (Berkeley), for having named some of these insects; the major part of them was identified by Dr. C. Ferrière of London. Several records on Coccinellidae are taken from Mr. A. Alfieri's collection.

The following list of parasitic and predaceous insects is a preliminary one. Several doubtful species have not yet been included. The list should only serve as a base for further studies on this subject. The order is alphabetical.

A. List of parasites and predators

I. Hymenoptera

1. *Achrysopophagus aegyptiacus* Mercet (*Encyrtidae*). — Bred by Alfieri from material of *Zilla*, infested with *Coccidae* (together with *Scymnus* and *Exochomus*).

2. *Anagyrus pseudococci* Gir. (*Encyrtidae*). — A common and efficient parasite of *Phenacoccus hirsutus* Green (Hibiscus mealy bug).

3. *Anagyrus greeni* How. — This species is recorded by a note of Mercet in Bull. Soc. Roy. Ent. d'Egypte, 1925, p. 46.

4. *Anicetus africanus* Gir. [= *Paracerapterocerus africanus* Gir.] (*Encyrtidae*). — Recorded by Mercet in Bull. Soc. Roy. Ent. d'Egypte, 1925, p. 53, fig. 2. — Bred by A. Alfieri from *Ceroplastes africanus* Green (attacked also by *Coccidiphaga scitula* Rmb.), on *Tamarix;* Wadi Kom (Asswan), 3.IV.1929; from *Ceroplastes africanus* Gr. on sunt (*Acacia arabica* var. *nilotica*), collection Ministry of Agriculture.

This species as well as the following are uncommon.

5. *Anicetus italicus* Masi. — Dr. Ferrière has given this name to a specimen bred on 12.IX.1929, from *Lecanium longulum* Dougl. (on *Acacia arabica* var. *nilotica*), taken at Kafr Zayât (Ministry of Agriculture).

6. *Aphytis chrysomphali* Merc. (*Aphelinidae*). — This is a very common minute species of polyphagous habits and is considered as one of the more valuable enemies of Diaspine Coccids. It breeds on *Aonidiella aurantii* Mask. and *Chrysomphalus ficus* Ril. (both on *Citrus*), but was also observed on *Chrysomphalus* (*Mycetaspis*) *personatus* Comst. (on *Mangifera indica*), and *Parlatoria oleae* Colv. (on olive), the latter record, however, was not confirmed since 1930. *Aphytis chrysomphali* Merc. is prevalent from June to February, may reach its greatest abundance in autumn, whilst it is scarce the remaining part of the year (February to May). It was taken all over the Delta, from Alexandria south up to Giza Province.

7. *Aphytis diaspidis* How. (*Aphelinidae*). — This form is not uncommon on *Parlatoria oleae* Colv., and was bred from scale material from apricot, pear. rose, oleander and *Ficus* spec. It is distributed over the Delta and was observed in the Nile valley as far south as Qena. Our records are from April.

8. *Aphytis maculicornis* Masi (*Aphelinidae*). — A polyphagous parasite of *Diaspinae*, fairly common. It was reared from *Parlatoria oleae* Colv. (in April and May) on olive, apple, pear and rose, from *Lepidosaphes ulmi* L. on grape vine, from *Diaspis echinocacti* Bouché on *Opuntia*, in the environs of Cairo and in the Delta. Our records go from December to April.

Novicky identified some material as *Aphytis maculicornis* ssp. *aegyptiaca* nov. (in litt.) but I do not think that this form has ever been described; Novicky remarked hereto (in letter of January 1929) : "The colour is more vivid than in ssp. *hispanica* Merc. from which it differs in the fore wing being broader." The specimens seen by Novicky were collected from *Aspidiotus cyanophylli* Sign. (Giza, January, on *Alternanthera*), and *Diaspis echinocacti* B. (Hawaber, March, on *Opuntia*).

I presume that all the material of this species would belong to this particular Egyptian subspecies.

9. *Aphytis mytilaspidis* Le Bar (*Aphelinidae*). — A common species, polyphagous. — It was bred from *Aonidiella aurantii* Mask. (on *Citrus*),

Aspidiotus cyanophylli Sign. (on *Alternanthera*), *Diaspidiotus lataniae* Sign. [= *cydoniae* Comst.] (on *Psidium guajava* L.), *Aspidiotus hederae* Vall. (on Jasmine), *Asterolecanium pustulans* Cock. (on *Ficus carica*), *Chionaspis striata* Newst. (on *Cupressus* and *Thuja*), *Diaspis echinocacti* Bouché (on *Opuntia vulgaris*), *Lepidosaphes conchiformis* Gmel. [= *ficus* Sign.] (on *Ficus carica*), *Lepidosaphes pinnaeformis* Bouché (on *Citrus*), *Lepidosaphes ulmi* L. (on *Vitis vinifera* and *Populus* spec.), and *Parlatoria oleae* Colv. (on apricot).

One record, from *Ceroplastes rusci* L. (on fig), I consider doubtful. Specimens were bred practically all the year round, and all over the Nile Delta, in Fayoum, and in the Nile valley south to Minia.

10. *Aspidiotiphagus citrinus* Craw. (*Aphelinidae*). — A very common and useful insect in the North, less numerous in the Southern Delta and in Giza Province. It may be reared all the year round but is no doubt more prevalent in autumn and winter. It was obtained from *Aspidiotus cyanophylli* Sign. (on *Alternanthera*), *Aspidiotus hederae* Vall. (on *Pittosporum*), *Chionaspis striata* Newst. (on *Cupressus*), *Chrysomphalus ficus* Ril. (on *Laurus nobilis*), and *Lepidosaphes pinnaeformis* Bouché (on *Citrus*).

11. *Aspidiotiphagus lounsburyi* Berl. and Paoli (*Aphelinidae*). — More abundant than the former, particularly in the coastal regions, but only locally found in the more southern parts of the country. Time of appearance as in the former species. *A. lounsburyi* was bred from the following Coccids :

Aspidiotus cyanophylli Sign. (from *Laurus nobilis*), *Aspidiotus hederae* Vall. (on *Oleander*, *Pittosporum* and *Duranta plumieri*), *Chionaspis striata* Newst. (on *Cupressus* and *Thuja*), *Chrysomphalus ficus* Ril. (on *Citrus*, Date Palm and *Laurus nobilis*), *Chrysomphalus* (*Mycetaspis*) *personatus* Comst. (on *Mangifera indica*), *Diaspidiotus lataniae* Sign. (on Oleander), *Diaspis echinocacti* B. (on *Opuntia*), *Fiorinia fioriniae* Targ. (on *Laurus nobilis*), *Lepidosaphes pinnaeformis* B. (on *Citrus*) and *Parlatoria proteus*.

12. *Azotus chionaspidis* How. (*Aphelinidae*). — Bred once in both sexes, 16.IV.1933, from *Chionaspis stanotophri* Cooley (on Halfa grass), taken at Helwân.

Identified by Dr. Ferrière.

13. *Baeoanusia oleae* Silv. (*Encyrtidae*). — Once only, from *Saissetia oleae* Bern., taken at Alexandria, on 3.VII.1930.

14. *Blastothrix erythrostethus* Walk. (*Encyrtidae*). — Was collected once from *Ceroplastes africanus* Green (on *Acacia arabica* var *nilotica*), at Wadi Kom, Asswân, 3.IV.1929.

15. *Bothriophryne* spec. (*Encyrtidae*). — From mixed material of *Cero-*

plastes rusci L. and *Asterolecanium pustulans* Cock. (on *Ficus carica*), at Derine, Talkha, on 26.IX.1929.

16. *Bothriophryne tenuicornis* Merc. [= *Trichomasthus tenuicornis* Merc.] (*Encyrtidae*). — Ref.: Mercet, Bull. Soc. Roy. Ent. d'Egypte, IX, 1925, p. 49, and Compere, Bull. Ent. Res. XXX, 1939, p. 21.

This species is known from *Ceroplastes africanus* Gr. (on *Albizzia lebbek*), collected by Alfieri at Beni Souef, on 25.IX.1921. It was not seen since.

17. *Coccophagus lunulatus* How. (*Aphelinidae*). — A regular parasite of *Lecanium* (*Coccus*) *hesperidum* L., bred from material of Sycamore (*Ficus sycomorus*), and *Citrus* (Shebîn-el-Qanater, Cairo, Meadi), emerged in September.

18. *Coccophagus scutellaris* Dalm. (*Aphelinidae*). — From *Lecanium hesperidum* L. (on *Citrus*) at Alexandria, June, and from *Pulvinaria floccifera* Westw. (on *Ficus* spec.) at Alexandria, January (coll. Alfieri).

19. *Diversinervus elegans* Silv. (*Encyrtidae*). — Distributed all over the Delta, and repeatedly bred from *Saissetia oleae* Bern. (on *Psidium guajava*, *Cycas revoluta*), *Pulvinaria floccifera* Westw. (host ?), and *Lecanium hesperidum* L. (on *Citrus*), in March, June, July, October and December.

20. *Encyrtus infelix* Embl. (*Encyrtidae*). — Both sexes in numbers ex *Saissetia hemisphaerica* Targ. (on *Cycas revoluta*), at Alexandria, in January.

21. *Enargopelta nigra* Merc. (*Pteromalidae*). — From *Lecaniodiaspis africana* Newst. (on *Psidium guajava*), from Luxor (Upper Egypt), in April and May.

22. *Enargopelta* spec. (*Pteromalidae*). — Ex *Asterolecanium pustulans* Cock. (on *Ficus carica*) from Mehalla-el-Kobra and Sohâg, in April, October and November..

23. *Euaphycus flavus* (How.) (*Encyrtidae*). — A common parasite of soft scales. Reared from *Lecanium hesperidum* L. (on *Citrus*), *Pulvinaria floccifera* Westw. (on *Psidium guajava*), and *Saissetia oleae* Bern. (on *Cycas revoluta*).

All over the Delta, in Upper Egypt found at Wasta; taken in March and April and again from July to October.

24. *Encarsia elegans* Masi (*Aphelinidae*). — Bred from *Aleurolobus niloticus* Priesner and Hosny (on *Zizyphus spina-christi*), on 5.III.1932, Assiout.

25. *Encarsia indifferentis* Merc. (*Aphelinidae*) [Ref.: Bull. Soc. Roy. Ent. d'Egypte, 1930, p. 220]. — Ex *Chionaspis striata* Newst. (on *Cupressus*), leg. Alfieri.

26. *Encarsia partenopea* Masi (*Aphelinidae*). — In the autumn a common parasite of the Aleurodid *Siphoninus granati* Priesner and Hosny (on *Punica granatum*), but also bred from an Aleurodid on cotton leaves (probably *Bemisia gossypiperda* Misra and Lamba); Cairo, Meadi, Fayoum, Sohâg.

27. *Eretmocerus corni* Hald. (*Aphelinidae*). — From an Aleurodid on cotton leaves, most probably *Bemisia gossypiperda* Misra and Lamba, in August, at Sohâg and Girga.

The three following species are parasites of Coccinellids feeding on Coccidae :

28. *Homalotylus flaminius* Dalm. (*Encyrtidae*). — Was taken from mandarine trees, attacked by *Lepidosaphes pinnaeformis* B., on 10.VII.1929, at Alexandria (host unknown), in August 1939 a male was bred from pupa of *Scymnus interruptus* Goeze.

29. *Homalotylus quaylei* Timb. (*Encyrtidae*). — In Cairo and Heliopolis (June and July), ex larvae of *Pharoscymnus varius* Kirsch (*Coccinellidae*), and probably also ex *Oxynychus marmottani* Fairm.

30. *Homalotylus vicinus* Silv. (*Encyrtidae*). — From material of *Phenacoccus hirsutus* (on grape vine), ex *Scymnus* spec. or *Oxynychus marmottani* Fairm.; Giza, VIII.

31. *Leptomastix flavus* Mercet (*Encyrtidae*). — Identified by Mercet, taken from *Pseudococcus filamentosus* Cock. (on *Albizzia lebbek*), VII.1926. leg. Alfieri (Ref.: Bull. Soc. Roy. Ent. d'Egypte, 1925, p. 46).

32. *Leptomastix phenacocci* Comp. (*Encyrtidae*). — Introduced by the Entomological Section, Ministry of Agriculture (Cairo), with material of *Phenacoccus hirsutus* from Buitenzorg, Java. Now established in Egypt.

33. *Marietta exitiosa* Comp. (?), det. Ferrière (*Aphelinidae*). — One specimen only so far, emerged 17.XI.1929, from material of twigs of *Ficus carica* from Kafr-el-Shekh, with *Asterolecanium pustulans*.

34. *Marietta* spec. (*Aphelinidae*), det. Ferrière. — From material of grape vine twigs, with *Lepidosaphes ulmi* L. from Menouf. 30.XII.1929 (*Physcus* spec. was also reared from this material).

35. *Metaphycus zebratus* Merc. (*Encyrtidae*). — Both sexes ex *Saissetia oleae* Bern. (on *Ficus carica*), Barrage Experiment Farm, and Mansurah, September till December 1933.

36. *Perissopterus* spec. (*Aphelinidae*) [ex *Diaspis echinocacti* B.] (on *Opuntia vulgaris*) from Hawaber (Daqahliya), in March, and *Lepidosaphes*

ulmi L. (on *Vitis vinifera*) from Mansura, Heliopolis and Beni-Souef, December to February. — Hyperparasite.

37. *Perissopterus zebratus* Merc. (*Aphelinidae*), det. Ferrière. — Bred from material containing *Parlatoria oleae* Colv. (on twigs of *Prunus armeniaca*, and *Oleander* leaves) from Kafr Dawâr and Qena, respectively; all in April. Also from *Ceroplastes africanus* material (on *Acacia arabica* var. *nilotica*) from Asswân, in April. — Hyperparasite.

38. *Physcus testaceus* Masi (*Aphelinidae*). — A very common and no doubt useful parasite. Only found on one species of *Coccidae : Lepidosaphes ulmi* L. (on grape vine and poplar), emerging all the year round, all over the Delta, and south to Beni-Souef.

39. *Prospaltella berlesei* How. (*Aphelinidae*). — The well known parasite of *Aulacaspis pentagona* Targ.; it is not very widely distributed but confined — as it seems — to the northern coastal region.

40. *Prospaltella* spec. (det. Ferrière). — Bred from an Aleurodid (on rose), 28th September, 1930, Cairo.

41. *Protyndarichus coccidiphagus* Merc. (*Encyrtidae*). — Probably all over the Lower and at least the northern Upper Egypt. Bred from *Lecanium hesperidum* L. (on *Citrus ?*), *Saissetia nigra* Nietn. (on *Ficus carica*), and *Lecaniodiaspis africana* Gr.; all emerged during October-November.

42. *Scutellista cyanea* Motsch. (*Pteromalidae*). — A common species, reared from *Ceroplastes africanus* Gr. (on *Acacia* var. *nilotica*, *Albizzia lebbek*, *Ficus carica*, and *Tamarix*), *Ceroplastes rusci* L. (on *Ficus carica*), *Saissetia nigra* Nietn. (on *Ficus sycomorus*), *Saissetia oleae* Bern. (on a Composite), *Saissetia hemisphaerica* Targ.. In the Nile Delta (Gharbîya), and the whole of Upper Egypt up to Asswân, from August till March.

II. Diptera

Two species of *Cecidomyidae* were reared from Coccidae, viz.: One from red larvae feeding on *Diaspis echinocacti* B. (on *Opuntia vulgaris*); this Cecidomyid is not rare at heavy infestations of the scale insect. A second species (or the same ?) was bred from larvae feeding on *Lepidosaphes ulmi* L. (on *Vitis vinifera*) in Cairo.

Hall mentioned a *Diplosis* spec. as attacking the mealy bug *Phenacoccus hirsutus* Gr.

III. Neuroptera

1. *Chrysopa vulgaris aegyptiaca* Nav. — Larva very common everywhere, polyphagous, and sucking out all sorts of insects; among the Coccidae,

Chrysomphalus ficus Ril., *Icerya aegyptiaca* Dgl., *Phenacoccus hirsutus* Gr. and *Pseudococcus filamentosus* Cock. were observed attacked by the larvae of this Neuropteron.

2. *Nefasitus fallax* Nav. — This name was given by Navas to our small Hemerobiid which was a common enemy of *Phenacoccus hirsutus* Gr., and other mealy bugs when they were more abundant as they are at present; with the marked decrease of the host, this little Neuropteron naturally has become much more scarce in recent years.

3. *Coniopterygidae.* — A good collection of this group is under study by the well known specialist Bo Tjedér; thus it is expected that the whole group will be studied more closely and results published separately. For the moment I can only state that according to Navas (Bull. Soc. Roy. Ent. d'Egypte, 1926, p. 209), *Conwentzia psociformis* Curt. and *C. pineticola* End. are of the more common species, feeding on scale insects, particularly on *Chrysomphalus ficus* Ril. (on *Citrus*); Hall mentioned the former as a predator of *Phenacoccus hirsutus* Gr.

The genus *Coniopteryx* Curt. is represented in Egypt by *several species* of which only one has been described hitherto, viz.:

Coniopteryx aegyptiaca Withycombe (Bull. Soc. Roy. Ent. d'Egypte, 1923, p. 146). Another genus — less common, represented by at least two species — is *Parasemidalis* End., of which *Parasemidalis pallida* With. (l.c., p. 141) is introduced into science.

Navas records (l.c.) *Semidalis curtisiana* End. as another Egyptian form, inhabiting the desert valleys south-east of Cairo.

IV. Coleoptera

A. Coccinellidae

1. *Chilocorus bipustulatus* L. — Is a general feeder on scale insects, of no great importance. It was taken from materials of *Chrysomphalus ficus*, and actually seen feeding on this scale insect, and it was also taken from *Lepidosaphes pinnaeformis* B. and *Asterolecanium bambusae* Boisd. (the latter according to Willcocks, A survey of the more important economic insects and mites of Egypt, 1922, p. 336).

2. *Exochomus flavipes* Thunbg. spp. *nigripennis* Er. — Usually feeding on Aphids and mealy bugs but also attacking *Chrysomphalus ficus*. This species is not rare, and, according to Moh. Kamâl, its economic importance is considerable.

3. *Pharoscymnus varius* Kirsch. (Ref.: Priesner, Min. Agric., Techn. Bull. 117, p. 18). — Of little importance, particularly fond of *Chrysomphalus ficus* Ril.

The beetle begins the attack of a scale insect usually at the side of the hard scale cover, cutting out a triangular portion whence it reaches the soft body of the insect. The larva is wholly black, and is comparatively short and stout, covered with long, fine hairs; pupa pale brownish, densely covered as well with rather long, erect, fine hairs. The beetle was also observed feeding on *Chionaspis striata* Newst. (on *Thuja*).

4. *Pharoscymnus sexguttatus* Gyllh. — Beside this, there are a few other species existing in Egypt, none of them of importance, we do not even know their hosts with certainty.

5. *Scymnus (Pullus) syriacus* Mars. — An enemy of *Phenacoccus hirsutus* Gr., *Pseudococcus filamentosus* Cock., and *Pseudococcus citri* Risso, particularly devouring the egg-masses, and no doubt feeding on other mealy bugs too. Willcocks thinks it may also feed on young stages of *Chrysomphalus ficus*. This species is common, and — as all other *Scymnus* — of importance in the control of mealy bugs; they would be an excellent help against Coccids, if they were not parasitized by *Homalotylus* spp. and probably other *Chalcidoidea*.

6. *Scymnus (Pullus) pallidivestis* Muls. — Feeds on egg-masses of *Phenacoccus hirsutus* Gr. and *Pseudococcus filamentosus*, and other species of the latter genus, as the former (No. 5) does; it also attacks the Aleurodid *Siphoninus granati* Priesner and Hosny (on pomegranate); it is common on sugar cane too, and has most likely to do with *Pseudococcus sacchari* Cock. It is a very common and useful insect.

7. *Scymnus interruptus* Goeze. — One of the most common species of the genus *Scymnus* in Egypt; though it is usually found in connection with Aphid attacks, it is also very fond of mealy bugs; it is the same species as is reported by Adair, Willcocks and Hall under the name of *Scymnus biverrucatus* Panz.

Hall mentions it as enemy of *Phenacoccus hirsutus* but it is certainly not confined to this mealy bug only. It is parasitized by *Homalotylus flaminius* Dalm.

8. *Scymnus includens* Kirsch. — Was seen feeding on *Pseudococcus citri* Ri., *Chrysomphalus ficus* Ril., and *Pinnaspis zillae* Hall, but is much less common than the former and only of limited and local importance.

9. *Scymnus (Nephus) kiesenwetteri* Muls. — Rather common but of little use, as it is generally found on *Tamarix*, associated with *Naiacoccus serpentinus* var. *minor* Green.

10. *Scymnus (Nephus) tamaricis* Capra. — In Upper Egypt on *Tamarix*

(ex coll. Alfieri), probably replacing *Scymnus kiesenwetteri* Muls. — Host presumably the same.

11. *Scymnus* (*Nephus*) *bipunctatus* Kug. — Was found at the Delta Barrage, on *Chenopodium* spec., feeding on *Pseudococcus* spec. (ex coll. Alfieri).

12. *Oxynychus marmottani* Fairm. — Attacking *Phenacoccus hirsutus*, *Pseudococcus filamentosus*, and other *Pseudococcus* spp. — Not rare but unfortunately checked by *Homalotylus* spp.

13. *Vedalia* (*Rodolia*) *cardinalis* Muls. — The well known predator of *Icerya purchasi*, was originally introduced, and has been well established for years.

Preying on *Icerya aegyptiaca*, and — according to Moh. Kamâl — on *Pulvinaria* spp. too.

14. *Novius rufipennis* Pic. — Enemy of *Pseudaspidoproctus hyphaeniacus* (Hall), on the Doum Palm (*Hyphaene thebaica*) in the oasis Kharga and perhaps elsewhere in Upper Egypt. The beetles emerge from the red larvae as early as in April. — No economic importance.

B. Nitidulidae

1. *Cybocephalus flaviceps* Reitt. — Common, both larvae and adults feeding on *Chrysomphalus ficus* Ril. (on *Citrus*), *Diaspis echinocacti* B. (on *Opuntia vulgaris*), *Lepidosaphes ulmi* L. (on *Vitis vinifera*), *Pinnaspis zillae* Hall (on *Calotropis procera* and *Zilla spinosa*).

2. *Cybocephalus* spp. and *Dissia* spp. are under study.

V. Lepidoptera

1. *Autoba beraudi* Joannis. — Feeds on egg-masses of *Phenacoccus hirsutus* Green.

2. *Autoba gayneri* Rothsch. — Is reported feeding on *Phenacoccus hirsutus* Gr., and also *Asterolecanium pustulans* Cock. may, after Adair, be one of the hosts.

3. *Autoba teilhardi* Joannis. — Was not yet seen feeding on Coccidae but has very likely similar habits as the two preceding species.

4. *Coccidiphaga scitula* Ramb. — Reared from *Ceroplastes africanus* Gr. (on *Tamarix* and other plants), *Lecaniodiaspis africana* Newst. (on *Ficus carica*), and *Lecanium longulum* Dgl. (on *Acacia nilotica* and *Albizzia lebbek*). — Common.

5. *Rivula sericealis* Scop. — According to Hall, this species feeds on *Phenacoccus hirsutus* Gr.

6. *Stathmopoda auriferella* Mayr. — Was bred from material of *Phenacoccus hirsutus* but this record was not confirmed later.

VI. Thysanoptera

1. *Karnyothrips flavipes* (Jones) [=*longisetis* Bagn.]. — Adults and larvae prey on *Asterolecanium pustulans* Cock. (on *Ficus carica*), *Saissetia oleae* Bern. (on *Psidium guajava*), *Lepidosaphes pinnaeformis* B. (on *Citrus*), *Lepidosaphes ulmi* L. (on *Vitis*), *Aonidiella inopinata* Leon., *Parlatoria oleae* Colv. (on apple), *Fiorinia fioriniae* Targ. (on *Laurus nobilis*), and *Aspidiotus hederae* Vall. — Common.

2. *Karnyothrips melaleucus* (Bagn.) [Ref. : Bull. Soc. Roy. Ent. d'Egypte, 1931, p. 274]. — Only once found — by Alfieri — on bamboo infested with *Asterolecanium bambusae* Boisd.

3. *Haplothrips cahirensis* (Tryb.). — Common on trees and shrubs, feeds on eggs and larvae of scale insects, particularly *Diaspinae*, as e.g. : *Chrysomphalus ficus* Ril., *Coccomytilus halli* Green, *Asterolecanium pustulans* Cock., *Pulvinaria floccifera* Westw.

4. *Podothrips aegyptiacus* Pries. — Common under leaf-sheaths of *Phragmites communis*, adults and larvae feeding on *Ripersia phragmitis* Hall.

B. List of hosts

I. Coccidae

Aonidiella aurantii Mask. : *Aphytis chrysomphali* Merc., *Aphytis mytilaspidis* Le Bar.

Aonidiella inopinata Leon. : *Karnyothrips flavipes* (Jones).

Aspidiotus cyanophylli Sign. : *Aphytis maculicornis aegyptiaca* Nov., *Aphytis mytilaspidis* Le Bar, *Aspidiotiphagus citrinus* Craw., *Aspidiotiphagus lounsburyi* Berl. and Paoli.

Aspidiotus hederae Vall. : *Aphytis mytilaspidis* Le Bar, *Aspidiotiphagus citrinus* How., *Aspidiotiphagus lounsburyi* Berl. and Paoli, *Karnyothrips flavipes* Jones.

Asterolecanium bambusae Boisd. : *Chilocorus bipustulatus* L., *Karnyothrips melaleucus* (Bagn.).

Asterolecanium pustulans Cock. : *Aphytis mytilaspidis* Le Bar, *Enargopelta*

spec., *Haplothrips cahirensis* Tryb., *Karnyothrips flavipes* Jon., *Marietta exitiosa* Comp. (?), *Autoba gayneri* Rotsch. (?).

Aulacaspis pentagona Targ. : *Prospaltella berlesei* How.

Ceroplastes africanus Green : *Anicetus africanus* Gir., *Blastothrix erythrostethus* Walk., *Bothriophryne tenuicornis* Merc., *Coccidiphaga scitula* Ramb., *Perissopterus zebratus* Merc., *Scutellista cyanea* Mot.

Ceroplastes rusci L. : *Aphytis mytilaspidis* Le Bar, *Bothriophyne* spec., *Scutellista cyanea* Motsch.

Chionaspis stanotophri Cooley : *Azotus chionaspidis* How.

Chionaspis striata Newst. : *Aphytis mytilaspidis* Le Bar, *Aspidiotiphagus citrinus* How., *Aspidiotiphagus lounsburyi* Berl. and Paoli, *Encarsia indifferentis* Merc.

Chrysomphalus ficus Ril. : *Aphytis chrysomphali* Merc., *Aspidiotiphagus citrinus* Craw., *Aspidiotiphagus lounsburyi* Berl. and Paoli, *Chilocorus bipustulatus* L., *Chrysopa vulgaris* ssp. *aegyptiaca* Nav., *Caniopterygidae* spp., *Cybocephalus flaviceps* Reitt., *Exochomus flavipes* ssp. *nigripennis* Er., *Haplothrips cahirensis* Tryb., *Pharoscymnus varius* Kirsch, *Scymnus includens* Kirsch, *Vedalia (Rodolia) cardinalis* Muls.

Chrysomphalus (Mycetaspis) personatus Comst. : *Aphytis chrysomphali* Merc., *Aspidiotiphagus lounsburyi* Berl. and Paoli.

Coccomytilus halli Green : *Haplothrips cahirensis* Tryb.

Diaspidiotus lataniae Sign. (= *cydoniae* Comst.) : *Aphytis mytilaspidis* Le Bar.

Diaspis echinocacti Bouché : *Aphytis maculicornis* ssp. *aegyptiaca* Nov., *Aphytis mytilaspidis* Le Bar, *Aspidiotiphagus lounsburyi* Berl. and Paoli, *Cybocephalus flaviceps* Reitt., *Perissopterus* spec.

Fiorinia fioriniae Targ. : *Aspidiotiphagus lounsburyi* Berl. and Paoli, *Karnyothrips flavipes* Jones.

Icerya purchasi Mask. : *Vedalia (Rodolia) cardinalis* Muls.

Icerya aegyptiaca Dougl. : *Vedalia (Rodolia) cardinalis* Muls.

Lecaniodiaspis africana Newst. : *Coccidiphaga scitula* Ramb., *Enargopelta nigra* Merc., *Protyndarichus coccidiphagus* Merc., *Scutellista cyanea* Motsch.

Lecanium (Coccus) hesperidum L. : *Coccophagus lunulatus* How., *Coccophagus scutellaris* Dalm., *Diversinervus elegans* Silv., *Euaphycus flavus* How., *Protyndarichus coccidiphagus* Merc.

Lecanium (Coccus) longulum Dougl. : *Anicetus italicus* Masi, *Coccidiphaga scitula* Ramb.

Lepidosaphes conchiformis Gmel. (=*ficus* Sign.) : *Aphytis mytilaspidis* Le Bar.

Lepidosaphes pinnaeformis Bouché : *Aphytis mytilaspidis* Le Bar, *Aspidiotiphagus citrinus* Craw., *Chilocorus bipustulatus* L., *Karnyothrips flavipes* Jones.

Lepidosaphes ulmi L. : *Aphytis maculicornis* Masi, *Aphytis mytilaspidis* Le Bar, *Cybocephalus flaviceps* Reitt., *Karnyothrips flavipes* Jon., *Marietta* spec., *Perissopterus* spec., *Physcus testaceus* Masi.

Leucaspis riccae Targ. : *Cybocephalus* spec.

Naiacoccus serpentinus var. *minor* Green : *Scymnus (Nephus) kiesenwetteri* Muls., *Scymnus (Nephus) tamaricis* Capra.

Parlatoria oleae Colv. : *Aphytis chrysomphali* Merc.(?), *Aphytis diaspidis* How., *Aphytis maculicornis* Masi, *Aphytis mytilaspidis* Le Bar, *Karnyothrips flavipes* Jon., *Perissopterus zebratus* Merc.

Parlatoria proteus Curt. : *Aspidiotiphagus lounsburyi* Berl. and Paoli.

Phenacoccus hirsutus Green : *Anagyrus pseudococci* Gir., *Autoba beraudi* Joannis, *Autoba gayneri* Rothsch., *Chrysopa vulgaris* var. *aegyptiaca* Nav., *Coniopterygidae* spp., *Diplosis* spec., *Leptomastix phenacocci* Comp., *Nefasitus fallax* Nav., *Rivula sericealis* Scop., *Vedalia (Rodolia) cardinalis* Muls., *Scymnus interruptus* Goeze, *Scymnus (Pullus) pallidivestis* Muls., *Scymnus (Pullus) syriacus* Mars., *Stathmopoda auriferella* Mayr.

Pinnaspis zillae Hall : *Cybocephalus flaviceps* Reitt., *Scymnus includens* Kirsch.

Pseudaonidia glandulosa Newst. : *Karnyothrips flavipes* Jones.

Pseudaspidoproctus hyphaeniacus Hall : *Novius rufipennis* Pic.

Pseudococcus citri Risso : *Oxynychys marmottani* Fairm., *Scymnus includens* Kirsch, *Scymnus (Pullus) syriacus* Mars.

Pseudococcus filamentosus Cock. : *Leptomastix flavus* Merc., *Oxynychus marmottani* Fairm., *Scymnus (Pullus) pallidivestis* Muls., *Scymnus (Pullus) syriacus* Mars.

Pseudococcus sacchari Cock. : *Exochomus flavipes* Thbg. var. (introduced from South Africa) ; *Scymnus (Pullus) pallidivestis* Muls.

Pulvinaria floccifera Westw. : *Coccophagus scutellaris* Dalm., *Diversinervus elegans* Silv., *Euaphycus flavus* How., *Haplothrips cahirensis* Tryb., *Vedalia (Rodolia) cardinalis* Muls.

Ripersia phragmitis Hall : *Podothrips aegyptiacus* Priesner.

Saissetia hemisphaerica Targ. : *Encyrtus infelix* Embl., *Scutellista cyanea* Motsch.

Saissetia nigra Nietn. : *Protyndarichus coccidiphagus* Merc., *Scutellista cyanea* Motsch.

Saissetia oleae Bern. : *Baeoanusia oleae* Silv., *Diversinervus elegans* Silv., *Euaphycus flavus* How., *Karnyothrips flavipes* Jon., *Metaphycus zebratus* Merc., *Scutellista cyanea* Motsch.

II. Aleurodidae

Aleurolobus niloticus Priesner and Hosny : *Encarsia elegans* Masi.

Bemisia gossypiperda Misra and Lamba : *Encarsia partenopea* Masi, *Eretmocerus corni* Hald.

Siphoninus granati Priesner and Hosny : *Encarsia partenopea* Masi, *Scymnus (Pullus) pallidivestis* Muls.

Séance du 2 Octobre 1940

Présidence de Monsieur le Professeur MAHMOUD TEWFIK HIFNAOUI Bey,
Président.

On some Egyptian Diapriidae

[Hymenoptera : Proctotrupoidea]

by Prof. Dr. H. PRIESNER

Genus Trichopria Ashm.

Key to Egyptian Species

1(10) Macropterous.

2(9) Antennal club distinctly three-jointed.

3(6) Antennae and legs with at least clubs of scape, femora and tibiae dark. Small species.

4(5) Two small elongate scutellar foveae. Antennal joints 5-7 globular. Wings narrower, fringe short .... 1. *aegyptiaca* spec. nov.

5(4) One transverse fovea. Antennal joints 5-7 elongate. Wings broader, fringe long. .... 2. *cheopis* spec. nov.

6(3) Legs and antennae pale fulvous or yellow.

7(8) Larger and broader. Head broad, transverse. Scutellum with one fovea. .... 3. *hannai* spec. nov.

8(7) Smaller and slenderer. Head longer than broad, narrowed posteriorly. Scutellum with two very small united foveolae. .... 4. *delicatula* spec. nov.

9(2) Antennal club four-jointed, or antennae gradually thickened.

10(11) Two small foveae at base of scutellum. Thorax depressed. Antennal club distinctly four-jointed; scape with apical margin sharpened

within, forming a tooth-like projection. Abdomen elongate, abruptly narrowed before apex .... 5. *masrensis* spec. nov.

11(10) A shallow transversely horse-shoe-shaped fovea at base of scutellum. Thorax convex. Antennae gradually enlarged towards tip, club indistinctly five-jointed, the joints not closely united, nearly pedicellate. Head strongly narrowed posteriorly. Larger species .... 6. *helouanensis* spec. nov.

12(1) Brachypterous. — Wings reaching but first third of abdomen. Antennae and legs yellowish, club indistinctly separated. Head large. Thorax reddish, head and abdomen dark .... cf. *Phaenopria alexandrina* spec. nov.

1. Trichopria aegyptiaca spec. nov.

A comparatively small species.

Female: Black, shining, practically without punctuation, antennal scape (except base or basal half which is yellow to reddish) and club black, joints 2-9 more or less dark yellowish-brown, in some cases more yellowish-brown, in some cases more yellowish-grey. Legs brownish, trochanters, the slender portion of the tibiae, and the tarsal joints 1-4 testaceous; coxae dark, paler at tips, sometimes wholly testaceous. Pubescence of pronotum, propodeum and petiolus whitish-grey. Wings hyaline, marginal vein testaceous.

Head nearly globular, distinctly somewhat broader than long, temples (viewed from above) much longer than eyes, distinctly narrowed posteriorly; head somewhat broader than thorax, antennal projection comparatively little developed; eyes little protruding, practically smooth; temples somewhat tomentose. Antennae length 0.78 mm.; scape thin at base, gradually much thickened, apical half somewhat compressed, as long as joints 2-5 united [1]; flagellum slender; joint 2 oval, much thicker and somewhat longer than 3; joints 4-9 little differing in shape from one another; *club sharply separated, three-jointed*, joint 10 distinctly shorter than 11, somewhat narrower, 12

(1) Superficial calculation of the comparative measurements may lead to considerable errors, thus descriptions ought to be always accompanied by absolute measurements. The objection that absolute measurements are misleading since insects vary greatly in size, is not correct: if we had correct absolute measurements at hand instead of the poor descriptions by the older authors, we should be able to correctly interpret most of the insects concerned, whilst because of the absence of such measurements, in most of the cases, an examination of the types is or will be necessary. If a series of specimens is at hand, it is, as to my opinion, advantageous to designate a specimen of medium size as type, and to take the measurments of the taxonomically most important parts of the body.

somewhat longer than the preceeding joint. Thorax higher than broad, normal, somewhat depressed above, with whitish tomentum in front; mesonotum separated from the scutellum, as usual, by a fine line, a little longer than broad; *scutellum with two very small, anteriorly converging longitudinal foveae* which are connected by a very shallow impression, and is sometimes visible only if viewed from a certain angle; scutellum somewhat convex posteriorly. Wings rather narrow, far surpassing apex of abdomen, distinctly fringed, the pale costa not reaching basal third of wing, marginalis thickened, basalis not even indicated. Median keel moderately developed at base of propodeum, somewhat triangularly protruding, dark. Petiolus short, transverse, with short and dense tomentum; the following abdominal segments together *elongate-ovate*, segment II occupying more than two-thirds of the length; III little longer than IV, V again longer; tip of abdomen short-triangular. Fore tibiae club-shaped, middle ones as well, slightly S-shaped, hind tibiae with club rather abrupt, about terminal third, interiorly with a series of densely set setae, exteriorly they are very sparingly set.

Measurements (in μ) : Head length, 225; head width, 282; hight, 265; eyes diameter, 78-79; antennae length, 779; lengths (breadths) of joints, 228(39), 79(36), 55(28), 43(30), 43(30), 39(32), 43(35), 39(35), 35(37), 63(57), 71(67), 98(67); joints 9-12 inclusive pedicel 45, 75, 79-83, 104; thorax length [2] 433, width 260; wings length 1020-1047 (small specimen 934), width 450-467; fringe (at apex of fore wings) 70; petiolus length (from above) 95, laterally 138; tergite II length, 433; tergites from II to apex, 528; tergite II width, 294-346; hind tibiae length 311; joints of hind tarsi length, 99, 57, 43, 39, 69-71 (without claws). — Total body length, 1.26-1.31 (small specimen 0.99) mm.

Male: I have only two specimens of this sex showing the *Planopria*-type of antenna. In coloration of body and legs, the male agrees with the female, and also in the shape of head and thorax. Abdomen elongate-ovate but not quite as long as in the female, segments 3-4 short, the terminal segment much narrower, rounded apically. Fringe of wings distinctly longer; wings surpassing tip of abdomen for 1/3 of their length. Foveolae of scutellum less distinctly separated, representing a single shallow fovea with a deeper, small impression on each side; if it was not for the flat thorax, I might have considered this ♂ as belonging to *Tr. cheopis*, described below.

Antennae black, shining, scape fulvous in basal half, joint 2 dusky or dark brownish; scape a little longer than the three following joints united: antenna not quite as long as the body, joint 2 oval, 3 elongate, longer, with two whirls of setae, slightly widened towards apex, 4 a little shorter, some-

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(2) Inclusive propodeum.

what thickened, emarginated within (about two basal thirds), with a distinct small black spine about the apical third ; joints 5-13 without long pedicel ; a very short pedicel is only just recognizeable on joints 5-6-7 ; joints 4-13 each with 1 whirl of moderately long, dark setae ; 14 irregularly set with dark setae, conical.

Measurements (dry mount) in μ : Head length, 208 ; width, 300 ; hight 277 ; antennal joint 2, 69, joint 3, 95, joint 4, 95, joints 5 and 6, 69, joint 12, 59 ; whirl hairs on joints 5 or 6, 87 long ; thorax length (medianly), 433-450 ; thorax width 277 ; scutellum (total length) 156 ; wings length 1125 ; petiolus (dorsal) length 104, hind tarsi length 372 ; abdominal segment II, length, 476, width 286. — Total body length : 1.298 mm. (small specimen, 0.969 mm.).

This species seems to be common in Egypt ; in numbers I found it in the detritus of a canal at Meadi, from March to August, and again from October to December ; it obviously occurs practically all the year round ; one specimen came to the light in April.

From the other Egyptian species of this genus, it is separated by the form of the scutellar foveolae combined with having the antennal club decidedly 3-jointed ; moreover, there is no further species known, presenting this combination of characters ; *T. musciperda* Kieff. (France), unknown to me but obviously somewhat similar as to shape of scutellar depression, is evidently a larger form (2 mm.), with thorax broader, antennal 2 equalling 3, 8 longer than broad ("wenig länglich"), mesonotum convex, petiolus more elongate, etc. On comparing the male with those described hitherto, it is thought to be near *Tr. lacustris* Kieff., but ours is a smaller form, having scape much longer, and joint 3 longer as compared with 2 ; *T. nigripes* Thms. which I possess from Austria (Linz and Sarleinsbach, VII-IX, leg. J. Kloiber), is much larger, has longer antennae with joints pedicelled, and with *long* whirls of setae.

2. Trichopria cheopis spec. nov.

Female : Black, clubs of femora and tibiae, and tarsal joint 5 brownish ; trochanters, base of femora, slender part of tibiae, and tarsal joints 1-4 yellow to dull yellowish, sometimes petiolus and tegulae or also a spot below the latter, partly brownish. *Coxae fulvous to rufous*, at most *slightly* shaded, always lighter than tibiae and femora ; antennae with basal half of scape rufous, joints 2-9 so or darker, more or less dark brownish ; wings hyaline. Very small, not fully mature specimens may have thorax wholly, head and abdomen partially reddish but are recognizeable as belonging to this species not only by the form of the antennal joints but also by the red coxae, whilst clubs of femora and tibiae are much shaded, and their thin parts are yellowish.

Head broader than long, eyes scarcely prominent, head narrowed behind. temples convex; ocellar triangle not equilateral; scape compressed in basal half, thin, thicker in distal half, *flagellum very slender*, joint 2 longish oval, 3 somewhat shorter and much narrower, 4-8 gradually shorter and slightly broader, all a little longer than broad, 9 scarcely longer than broad, little but somewhat, thicker than 8; *club sharply separated, three-jointed*, joint 10 much thicker than 9, about as long as broad (or very slightly longer), 11 somewhat thicker, as long as broad, 12 distinctly longer than 11. Thorax little narrower than head, slightly convex above, tomentum of pronotum slightly developed, scutellum slightly convex, sides somewhat converging posteriorly, in front with an arched, transverse fovea which is not deep at all but more deeply impressed laterally, ground shining to slightly rugose (striolate). Wings moderately broad, reaching far beyond tip of abdomen, fringe rather long. Propodeum with a triangular lamella. Petiolus, viewed from above, as long as broad, posteriorly with somewhat longer whitish pubescence at the sides; in lateral view straight below, convex in front, above; the remaining abdomen evenly fusiformly ovate, i.e. gradually pointed towards apex, upper and lower side convex; tergite III very slightly longer than IV, V somewhat shorter than III and IV united. Hind tibiae slightly curved, club-shaped in apical third; joint 1 of hind tarsi distinctly shorter than joints 2 and 3 united.

Measurements (in μ) : Head width, 294, head hight 260-295; diameter of eyes, 104; antennae length, 900; joints (holotype, dry mount), 2 : 78. 3 : 52, 10 : 61, 11 : 69, 12 : 110; joints (microscopic mount) measured from extreme base to apex), 242-260 (39), 87 (37), 59 (26), 51 (27), 49 (26), 47 (28), 55-57 (28), 49 (30), 51 (32), 63 (51), 79 (63), 114 (63) : club joints with pedicel, 75, 99 and 138; thorax length 450-535; width, 286; scutellum width about 120; wings length 1142-1160 (small specimen, 830, large one 1228-1349); length of costa + marginalis, 407; fringe length at apex of wing, 105; petiolus length, 110 (dorsal), 183 (lateral); tergite II length, 460; tergite II and following, 632-727 (smallest spec., 433); tergite II width, 295; hind tarsi length 345, joints, 110, 75, 57, 47, 73 (without claws). — Total body length : 1.436 mm. (largest specimen, 1.590; smallest one, 0.865 mm.).

Male : Unknown.

This species, though most similar to *T. aegyptiaca* in shape and colour, can only be compared with *T. hannai*, in having but one transversal fovea, and a sharply separated 3-jointed antennal club; from the latter it is distinguished by its smaller size, the shape of the antennal joints, particularly the comparatively larger terminal joint, moreover, by the less broad head and the darker coloration of antennae and legs; of the old palaearctic species, *musciperda* Kieff. may be taken for comparison; this species, however, apart from its differrently shaped scutellar fovea, has antennal joint 3 not shorter than 2, wings little surpassing tip of abdomen, and has coxae black; *tenui-*

cornis Thms. is said to have dark coxae and is no doubt a much larger insect.

Habitat : A series of 7 females of this insect were collected by me near the Pyramids of Gizah, on 4. VIII. 1933 and IX. 1933, from detritus of the Nile inundation ; 1 specimen (coll. Alfieri) was collected about the same locality and under the same circumstances, by Mr. A. Rabinovitch.

3. Trichopria delicatula spec. nov.

Female : Black, shining; prothorax, pleurae, propodeum and base of abdomen reddish, petiolus (and sometimes propodeum) yellowish-red, legs inclusive coxae, clear yellow (reddish-yellow), 5th tarsal joint slightly shaded, scape and flagellum yellow (reddish), the three club joints black. Costa and marginalis testaceous, tegulae reddish.

Head, seen from above, seemingly longish, about the anterior third (across eyes) broadest ; hence tapering toward base in an almost straight line ; ocellar triangle nearly equilateral. Scape curved, thin at base (compressed), well as long as the four following joints combined, 2 oval (narrow at base), about 1.5 times as long as broad (without root), 3 somewhat shorter and much thinner, elongate, 4-7 distincly longish, 8 about as long as broad, 9 a little broader, as long as broad or slightly transverse, 10 much broader than 9 but distinctly narrower than the penultimate, which is also not transverse, 12 about 1.5 times as long as 11, oval, straight exteriorly, convex interiorly. Thorax slender, elongate, somewhat narrower than the head, convex, tomentum of prothorax distinct, but not very thick, very little developed on occiput ; mesonotum, as usual, with 2 fine setae above ; scutellum convex, rounded in front, *where it has two very small punctiform foveolae which are united with each other ;* sides of scutellum slightly arched, narrowed posteriorly ; keel of propodeum blunt ; propodeum deeply excavated posteriorly. Wings moderately broad, long, far surpassing apex of abdomen, hyaline, with long fringe. Abdomen elongate-ovate, sides evenly convex, evenly pointed behind ; petiolus elongate, about 1.5 times as long as broad, with whitish pubescence posteriorly, which is arranged in two lateral tufts. Legs normal, hind tibiae with strong club in posterior third ; joint 1 little shorter than 2 and 3 united.

Measurements (measured from dry mount except antennal and tarsal joints), in μ : Head length (dorsal, median), 216, width 254, hight 294 ; eyes diameter 113-130 ; antennae length, 285 : joints lengths (breadths), 250 (47), 87 (39), 47 (28), 45 (28), 41 (30), 39 (32), 45 (33), 39 (34), 43 (37), 69 (61), 87 (73), 113 (73), thorax length 502, width 250 ; scutellum length 138 ; wings length, 1246-1263, width 363 ; costa + marginalis, 380 ; fringe length 87 ; petiolus (dorsal) 113-121, ventral (total) 173-190 ; tergite II length, 424 ; width, 310 ; tergite II and following combined, 588 ; hind tibiae, 345-363 ; hind tarsi, 345-355 ; joints 1-5 of hind tarsi, 114, 67, 57, 45, 79. — Total body length : 1.50-1.52 mm.

M a l e : Unknown.

Although this species is well characterized by the shape of body and antennae, and is a true *Trichopria*, it might be looked for in the genus *Phaenopria*. With *T. bipunctata* Kieff. and related spp., *T. delicatula* cannot be confused; it does not belong in this section of species, as can be seen from the convex thorax, the slender shape, the 3-jointed antennal club, and the fusiform shape of the abdomen; in *musciperda* Kieff., the only species to which one might refer, the scutellar foveae are surely larger, and fused in front; it is moreover larger, has wings shorter, legs darker, etc.; *T. cheopis*, described above, is similar in the antennae and wings, but the shape of the thorax, the scutellar foveolae, the coloration of legs and antennae are quite different.

H a b i t a t : I only caught two specimens of this insect, which I selected from detritus-material, collected at Gizah (4. VIII. 1933), together with the more common *T. cheopis*.

4. Trichopria hannai spec. nov.

F e m a l e : Black to piceous, shining, paler specimens have either pleurae and petiolus only, or the whole thorax dark reddish-brown, whereby also base of abdomen may be paler; antennal joints 1-9 yellow to fulvous (sometimes joint 10 too paler at base), club (10-12) dark; 5th joint of maxillary palpi shaded. Legs — inclusive coxae — yellow, last tarsal joint dark, costa and marginalis testaceous. Wings hyaline or *very* slightly yellowish.

Head heavy, as broad as the thorax, eyes not protruding, temples much narrowed posteriorly, scarcely convex, ocelli large. Scape compressed in basal half, claviform in distal half, joint 2 narrower but distinctly broader than 3, somewhat longer, its pedicel compressed, cup-shaped, 3 slightly constricted at base if viewed from a certain angle; the following joints gradually decreasing in length, 8 almost 1.5 times as long as broad, 9 longer than broad, somewhat thicker than 8; 10-12 forming a clearly separated, shining club, 11 at least in one direction distinctly broader than long, *12 scarcely longer than 11*, short, oval (almost cordiform), bluntly rounded at apex; joint 9 with a small tubercle distally, within; the apex of 11 slightly produced. exteriorly. Mesonotum slightly but distinctly convex above; scutellum in its posterior part — which is slightly and evenly elevated — somewhat broader than long, laterally distinctly margined, in front with one transverse, rather deep fovea, the sides of which somewhat converge posteriorly; scutellum without keel; propodeum with keel somewhat prominent but blunt basally; occiput and prothorax with greyish tomentum, pleurae, of mesothorax polished, of propodeum, and the petiolus adpressedly, not very densely pubescent; propodeum smooth, somewhat excavated in the middle of its hind margin, on either side of the keel. Wings far surpassing apex of abdomen, marginalis terminating about basal

third, truncate apically; fringe long, its length (at hind margin about one-third of breadth of wing. Petiolus nearly as long as broad, sides straight and parallel, with fine, white pubescence behind; abdomen (from segment II) elongate-ovate, evenly fusiform, segment IV nearly but one-half of segment III, segment V somewhat longer than III. Fore tibiae club-shaped, middle-tibiae S-shaped, apical *half* claviform, hind tibiae claviform in apical third, with dense fringe of setae at inner margin, with scattered long setae exteriorly; tarsi with long setae.

Measurements: Head length (dorsal), 345-363; width, 398; hight, 346; eyes diameter, 173; diameter of front ocellus, 43; antennae length, 1055-1160; joints lengths (breadths), the later measured from microscopic mount: 311-329(59-66), 87(52), 78(39), 69(37), 66(36), 61(37), 61(40), 61(42), 55(51), 87(79), 81(91), 112(83); club joints inclusive pedicel, 102, 102, 138; thorax length, 657-709; width, 380-398; petiolus (laterally, i.e. total) 234; width, 130; tergite II, length, 588; width, 484; tergite II and following, 865; wings length, 1263; width, 580; length from base to end of marginalis, 528; fringe (at apex of wing) 120; hind tibiae, 467; hind tarsi 415; hind tarsal joint (microscop. mount), 126, 79, 67, 57, 97. — Total body length : 1.68-1.97 mm.

(Owing to circumstances, the description of the male has to be given later).

Tr. hannai belongs in the section of the genus having sharply separated 3-jointed antennal club, normally developed scutellar fovea, and — even in fully mature specimens — pale antennae (exclusive club); it is characterized by the shape of the scapus and the funiclar joints, the short ultimate club-joint, the usually, at least laterally, reddish-brown thorax, and by the fusiform abdomen; it may be compared with *ciliaris* Kieff. (sensu Maneval, Bull. Mus. Hist. Nat. Belg., XIII, p. 11, figs, 1937) (3); but this species (common in Europe) has antennal club longer, less shining, joint 9 comparatively larger, joint 3 more elongate (distinctly longer than 2), scape normal, abdomen not fusiform, etc.; beside *ciliaris*, *T. madeirae* Kieff. comes near, has however joint 11 longer than broad, 12 pointedly oval, and the abdomen is said to be rounded apically.

Habitat: Some specimens were collected by me at the light at Meadi,

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(3) In my collection, there is a female example of this species, *identified* by Kieffer as *thomsoni* Kieff., a species to which Thomson as well as Kieffer refer a male that has planoprioid antennae, with a small denticle on antennal 3, and which is very similar to *Ashmeadopria verticillata* Kieff. in many other respects; this male, however, seems to belong to the female of another species which might be very difficult to separate from *A. verticillata* Kieffer (females). *Tr. verticillata* Thomson and *thomsoni* Kieffer (females) are most likely identical with *ciliaris* Maneval, and *ciliaris* Kieffer as well, provided that Maneval has actually compared with Kieffer's type.

in November, and some from the foliage of *Citrus* trees at Talbiah (Gizah), the same month; others were bred from pupae of *Drosophila* spec., by Dr. Assaad Hanna — to whom the insect is dedicated —, on rearing insects from pods of *Acacia arabica* var. *nilotica*, in the laboratory of the Entomological Section, Ministry of Agriculture, at Dokki.

5. Trichopria masrensis spec. nov.

Female: Black, shining, scapus and club black, joints 2-8 blackish-brown to reddish-brown; legs dark, trochanters. basal half of tibiae, and the tarsal joints 1-4 yellow or brownish-yellow; very similar in colour to *bipunctata* Kieff. to which it is closely related.

Head looking longish, eyes small, not protruding, not pilose; head with a few longer, scattered setae; ocelli close to one another; scape almost as long as the four following joints combined, slightly curved, widened toward apex, *apical margin somewhat sharpened and raised within, so that — viewed from above — it more or less protrudes (in profile) as a small, dark tooth;* this toothlet is not so well visible in small specimens as in large ones; joint 2 elongate-oval, well 1.6 times (to twice) as long as broad, *distinctly somewhat longer than 3*, which is about 1.5 times as long as broad; 4 and 5 slightly longer than broad, 6-8 globular, the latter (8) perhaps slightly transverse in one direction, little thicker than 7, so that the following 4-jointed club appears well separated; the club-joints 9-11, seen laterally. are slightly transverse, ultimate joint somewhat longer than broad, 1.5 times as long as 11, much shorter than the two preceeding joints united; tomentum on occiput scarce, on pronotum richer. Thorax little broader than the head, scutellum quadrangular, truncate posteriorly; *in front, as in bipunctata, with two separated shallow foveolae;* metathorax grey pubescent, hind angles produced into a small tooth; wings long, moderately broad (see measurements), considerably surpassing the abdomen, with but *moderately long fringe;* costa + marginalis occupying less than one-third of the wing's length; keel of propodeum, viewed laterally, only slightly raised in front. Petiolus short, somewhat broader than long, distinctly greyish pubescent in posterior half. Abdomen elongate, depressed as in *bipunctata*, slightly widened toward apex, abruptly narrowed in posterior fourth or fifth, and pointed; segment IV distinctly shorter than III. Legs *moderately* long (cf. *bipunctata*), fore tibiae club-shaped, middle tibiae slightly S-shaped, thickened in apical half, hind tibiae claviform in the two apical fifths (or more); joint 1 of hind tarsi about as long as 2 and 3 united.

Measurements (dry mount) in μ: Head length (dorsal), 260; width, 268; hight, 260; eyes diameter, 104; antennae length (max.) 952; joints lengths (breadths), 208-216(43), 69-78(38-40), 52, 43, 43(35), 42(35), 42(47),

43(61), 64(64), 67(69), 69(69), 90(61); thorax length, 433-450; width, 286; mesonotum length, 190; scutellum length, 130; wings length, 1125-1147; width, 407; length of costa + marginalis, 310; apical fringe, 87; petiolus (dorsal), 95-104; tergite II length, 450; width, 311; abdomen from segment II, 588; hind tibiae length, 330; hind tarsi length, 330; tarsal joints, 104, 61, 45, 42, 78. — Total body length : 1.384-1.557 mm.

T. masrensis is so close to *T.* (*T.*) *bipunctata* Kieff. (1911, in André, Spec. Hym. Eur.,. 10, p. 997; id., 1916, Tierreich, Lfg. 44, p. 86; Maneval, Bull. Mus. Hist. Nat. Belg., XIII, p. 10, figs) (4), that I had noticed the specific differences between the two species only after a close study; *masrensis* is distinguished from *bipunctata*, and perhaps all other known species which possess two scutellar foveae, by the small tooth-like projection of the apex of the scape; besides, joint 3 is shorter (than in *bipunctata*), less elongate, and the club joints are broader, the club — as a whole — better separated; the wings are narrower, and their discal setae are more closely set.

Male: Unknown.

Habitat: I found two females of *T. masrensis* in the detritus of an irrigation canal (30.V and 26.VI.1933) at Meadi; in Mr. Alfieri's collection were two further specimens, from Ikingi (Mariout), collected by Mr. A. Rabinovitch, on 10.VI.1936.

6. Trichopria helouanensis spec. nov.

Female: Black, shining, scape reddish in basal half, funicular joints red at extreme base; legs reddish to yellowish-brown (or dark yellow), with coxae, clubs of femora and tibiae, and 5th tarsal joint more or less slightly shaded; apex of abdomen sometimes brownish; wings hyaline.

Head a little broader than long, eyes large, head strongly narrowed behind them; *antennae very slender*, somewhat surpassing base of abdominal segment II; joints 3-5 appearing slightly club-shaped; scape thin in basal half (in one direction), rather gradually thickened towards apex; joints 2 and 3 about equal in length, 2 almost oval, 3 slightly concave in basal half; *joints gradually enlarged towards tip of antenna*, a club is not distinctly separated; *all joints at least slightly longer than broad;* tomentum on occiput and prothorax very well developed; thorax somewhat convex; scutellar fovea transverse, not deeply impressed, scutellum slightly convex, margined laterally, a little tapering posteriorly; propodeum deeply excavated, hind angles

(4) *T. bipunctata* is, as Maneval (l.c.) already mentioned, a very common and widely distributed species; it also occurs in Central Europe (Austria, in the Alps as well as in the Danube area, north into Bohemia), being there, as to my opinon, the most common species of the genus.

slightly pointed ; median keel triangular in front, black. Wings well surpassing the abdomen, normal, fringe moderately long. Petiolus somewhat longer than broad, with rather long erect pubescence all over, surface rugose, with fine longitudinal keel ; abdomen from segment II onward fusiform, convex, segment III about twice as long as IV, and longer than V. Legs slender, *hind tibiae distinctly* curved inward (at middle of length), sparingly set with setae exteriorly, provided with a dense comb of stronger setae inside ; club of tibiae occupying posterior third (or somewhat more) of them ; hind tarsi shorter than tibiae, joint 1 about as long as 2 and 3 united.

Measurements (from dry mount) in μ : Head length, 346 ; width, 380, high, 346 ; diameter of eye, 190 ; antennae length, 1420 ; joints lengths (widths), 363 (52), 95 (42), 95 (29), 87 (31), 78 (35), 86 (35), 104 (43), 95 (52), 95 (69), 95 (80), 86 (80), 142 (78) ; thorax length, 709 ; width, 433 ; scutellum length, 208 ; wings length, 900 ; width, 623 ; length of costa + marginalis, 588 ; fringe (at apex of wings), 104 ; petiolus length, 147 ; width, 105 ; tergite II length, 606 ; width, 467 ; tergite II and following tergites 952 ; tergite III, 78, tergite IV, 69 ; hind tibiae length, 570 ; hind tarsi length, 519 ; hind tarsal joints, 146-173, 95, 78, 69, 105. — Total body length : 1.99-2.08 mm.

Male : Unknown.

This species is quite peculiar among the Egyptian congeners, by the slender, gradually thickened antennae, the slender legs and the fusiform abdomen ; there is only *T. elongata* Thms. (from Europe), which may be similar ; though insufficiently described, it is shown that this species has wings shorter, little surpassing the abdomen, and joints 9-12 of equal width ; *helouanensis* comes also close to *T. elegans* spec. nov. (from the Vienna "Prater", leg. F. Blühweiss) which has however still more slender antennae [5] (and legs), with club much elongate, eyes somewhat protruding, hind tibiae more strongly curved, and hind tarsi longer than hind tibiae, very slender ; this species will be more fully described elesewhere.

Habitat : Three specimens from the following localities : Helouan (III, C. Koch), Meadi (IX, at light, H. Priesner), Wasfija (IV, A. Rabinovitch).

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[5] Measurements of antennal joints 2-12 of *T. elegans* nov. spec.: 95(39), 104(35), 110(35), 110(35), 87(35), 78(38), 70(38), 70(45), 80(53), 87(57), 81(47) μ.

Séance du 13 Novembre 1940

Présidence de Monsieur le Professeur MAHMOUD TEWFIK HIFNAOUI Bey, *Président*

The morphology, anatomy and biology of *Araecerus fasciculatus* De Geer

[Coleoptera: Anthribidae]

(with 1 Text-Figure and Plates I-VIII)

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A. INTRODUCTION

Araecerus fasciculatus De Geer is an Anthribid beetle of considerable economic importance. It is supposed to be indigenous in India, East Indies and the Malay States, but now its occurrence is more or less cosmopolitan, though it is more common in the tropical and subtropical countries. It was first described by De Geer (1775). Lucas (1861) recorded it boring into the branches of the Chinese ginger in France. Reh (1907) discussed its economic importance. He mentions its occurence on hard seeds, thick-skinned bulbs, palm seeds, nuts of *areca*, roots of ginger, coffee beans, nutmeg, mace, tamariscus, euphorbiaceae, cotton seeds, cacao beans, dried apples, peaches and oranges. According to him, its geographical distribution includes

India (where it is indigenous), Europe, U.S. America (Louisiana and Florida), Central America, French Guiana, Bermuda, Brazil, St. Helena, Persia. Ceylon, Java, China, Japan, Sandwich Isles and Philippine Isles.

Reh thinks that *Araecerus fasciculatus* De Geer has only one generation a year and, as well as Lucas, mentions about two weeks for the pupal period.

Tucker (1909) records its occurrence in corn-stalks in fields adjacent to cotton in Louisiana, and points out that it is found in association with the cotton boll weevil in the corn-stalks. He states that the insect is sometimes a scavenger feeding on the decayed cotton bolls.

Again, Van der Goot (1917) records it as a field pest on *Tephrosia candida* in Java and he calls it the *Tephrosia* beetle. He points out that the *Tephrosia* beetle (which was identified by European entomologists as *Araecerus fasciculatus* De Geer) does not attack stored coffee or cacao in Java although these are attacked by *Araecerus fasciculatus* De Geer in the island. It is also interesting to note that according to Van der Goot, *Tephrosia vogeli* is immune from the attacks of the *Tephrosia* beetle even if grown among seriously infested trees of *Tephrosia candida*. This shows that the beetle has developed a food preference instinct to a great extent when it is known that the attack of *Tephrosia candida* is caused by the beetles flying from wild leguminoseae, especially *Crotalaria striata*. On the other hand, *Araecerus fasciculatus* De Geer as a stored product insect is polyphagus to a great extent, feeding on all sorts of seeds and grains especially if they are not dry. It can also live to a certain extent on flour, thrives on biscuits and even the ordinary bread preferring the crumb to the crust.

Rutgers (1918) also seems to doubt the identity of the *Tephrosia* beetle, stating that *Araecerus fasciculatus* De Geer severely attacked a sample of Liberian coffee, but that either this beetle or a closely related one attacks the seeds of *Crotalaria* and *Tephrosia*.

Cotton (1921) wrote a very short description of the external appearance of the four stages of the insect. The points of difference between his description and the writer's are discussed later under different headings.

Autuori (1931) published a short external description of all the stages with a reference to the biology. His work was concerned with *Araecerus* as a pest on Brazilian coffee.

Lefroy (1909) states that *Araecerus fasciculatus* De Geer or « a very closely allied species breeds freely in old, dried cotton seeds that remain on the plant after picking ». If Lefroy's illustrations are correct, the insect concerned cannot be *Araecerus fasciculatus* De Geer. Differences between cotton seed beetle in India and *Araecerus fasciculatus* De Geer are discussed later.

Ogilvie (1925) records it on stored maize in Bermuda where it is also

found associated with the « black tip » disease of banana which causes the black discolouration of the skin of the fruit and this is subsequently attacked by the larva of *Araecerus fasciculatus* De Geer. It is recorded damaging the boll and seeds of the cotton plant in Africa (Zacher, 1913), attacking cacao in Gold Coast in the drying stages and then in the stores (Patterson, 1928), on cacao pods in Nigeria (Lamborn, 1914), in coffee berries in Dutch East Indies (Friederichs, 1925), where it attacks Brazil nuts as well (Gater, 1925), on *Areca catecha* (Papilionaceae) in India (Beeson, 1919), on monkey-pod (*Samanea saman*) in Hawai (Bridwell, 1920) and carrier of the fungus *Diplodia* in Philippines where it attacks a number of plants in storage, including roots, seeds and fruits (Sarmiento, 1923). It is interesting to note that Tucker (1908), Van der Goot (1916), Crawford (1916) and Bridwell (1919) have referred to parasites of the beetle. One of the parasites referred to is a mite belonging to the genus *Pediculoides* and most of the rest are Hymenopterous, two being Braconids (and according to Van der Goot, these are not yet identified). There is no reference as to the possibility of controlling the insect by any of the above parasites. The pest is certainly more important in stored products than in the field, and hence controlling it by the use of parasites is not likely to be effective, except in a place like Gold Coast where the infestation originates in the field.

Araecerus fasciculatus De Geer was first recorded as a British insect in 1831 by Stephens in London, Suffolk and Devonshire under the name *Phloeobius griseus* Fab.; it was recorded by him again in 1839.

Shuckard and Spry (1840) recorded it and stated that it was imported. Crotch (1866) in his « Catalogue of British Coleoptera » records it under « accidently introduced species ». Bold (1872) records *Phloeobius griseus* Fabr. from Sunderland. Fowler (1891) states that « the single species of *Araecerus* which is found on the Continent is evidently an importation ». Newbery (1902) records the occurrence of *Tropideres* (*Enedreytes*) *hilaris* Fahrs., in a London Warehouse. According to Day (1908) — who records *Araecerus* in a biscuit factory in Carlisle — Newbery was under a misapprehension in 1902 as he admitted later that what he had described as *Tropideres hilaris* Fahrs. was really *Araecerus fasciculatus* De Geer.

It has been recorded by Munro and Thompson (1929) in London docks on consignments of nutmeg from Grenada and East Indies; also in West African and Panama cacao, and occasionally, in cacao from Venezuela, Ecuador, and Ceylon. They remark that the insect « although abundant in Grenada nutmegs, occured in only one of about a dozen consignments of Grenada cacao examined ». Cotterell (1934) refers to its economic importance as a stored cocoa pest in Gold Coast. It has been observed in Egypt in imported nutmeg.

There are several more references indicating the geographical distribution of the insect and the infestation of a great variety of foods.

The writer worked the biology of *Araecerus fasciculatus* De Geer with special reference to the effects of variations in the nature and water content of the food. This work has been published in the Annals of Applied Biology, London, 1935.

B. ACKNOWLEDGMENTS

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C. MORPHOLOGY OF THE ADULT

The length of the adult (Fig. 1, and Plate I, fig. 1) ranges from 2.7 to 5.3 mm.; while the breath ranges from 1.7 to 2.1 mm.; the minimum measurements appearing only in very rare cases.

The colour is dark brown in mature individuals and lighter when newly emerged. The colour is not uniform on the head, prothorax and elytra, owing to the distribution of bristles and to the presence of dark and white patches on the elytra and to less extent on the prothorax. The sternites are uniformly dark brown and clothed with whitish bristles except on the anterior part of the mesosternum. The thoracic and abdominal terga are almost pale amber in colour except the meta-tergal ridges and the meso-scutellum which are more heavily chitinised. The pro-pygidium and pygidium are highly chitinised.

1. The Head

As in other Rhynchophora, the elements constituting the head of *Araecerus fasciculatus* De Geer are completely fused (Plate I, figs. 2, 3 and 4). The head is heavily chitinised with a large mouth area. Its breadth in the eye region nearly equals that of the anterior margin of the prothorax which overlaps it. It is a little longer than the prothorax, but about as long as the mess — and metathorax combined. The epicranial suture (Plate I, figs 2 and 4 E.S) runs from the posterior margin of the head as far as the line joining the anterior margin of the eyes. At first it is a clear suture, then

for a short distance it is not clear, and finally is continued as a heavily chitinised line. There are no epicranial arms defining the frontal area which is completely fused with the epicranium. The dorsal side of the head capsule ends anteriorly at the epistoma which runs across the head and to which the labrum is attached by a narrow membrane. The mandibles are articulated

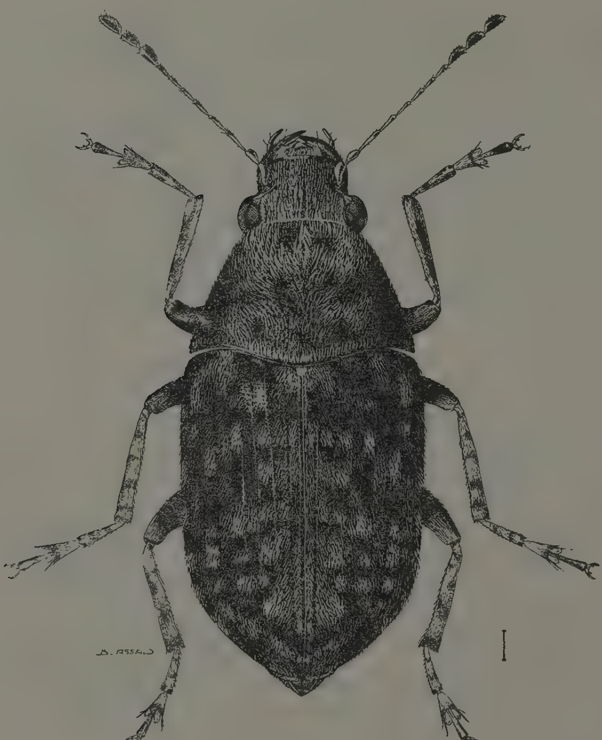

Fig. 1. — *Araecerus fasciculatus* De Geer : adult. — × 18.

to the ends of the epistoma. The fusion of the sclerites is continued on the lower side of the head (Plate I, fig. 3). On the ventral side, the head capsule ends in a bilobed structure (labiophore [Jordan]) to which the labium is connected. The head is constricted ventrally and laterally by a well marked depression. This separates the pregenal area and the bilobed structure from the rest of the head. There is no gula. The occipital foramen (Plate I, fig. 30F) is fairly large, triangular and is bounded by a less chitinised area.

The occipital apodeme, which is partly hidden by the occipital area, is continuous with the epicranial suture.

Vestiture

There are whitish bristles clothing the dorsal side and these are very few posteriorly where it is covered by the pronotum. The ventro-lateral area representing the pregena is clothed with bristles. The largest part of the ventral side of the head (bounded anteriorly and laterally by the depression already mentioned) is without bristles. The head is dorsally ornamented by pentagonal areas with narrow and more chitinised areas in between, i.e. clathrate. The bristles arise from the pentagonal areas (Plate I, fig. 5). This ornamentation is not clear in the frontal area behind the epistoma. The ventral aspect of the head shows very thin transverse ridges and furrows.

The Epistoma

The epistoma is represented in both adults and larvae. Externally it is the fronto-clypeal area defined from the rest of the head by a marked elevation. It shows some homology with that of *Dendroctonus valens* studied by Hopkins (1921, pp. 11-13). There is a fringe of bristles in the centre, almost covering the labrum. These (Plate I, figs 1, 2, 4 and 5) tend to converge distally. Laterally, there are the epistomal processes ; these seem to correspond with the « precoila » of Stickney (1923) and from each of them arises a fringe of bristles directed towards the labrum. The ventral aspect of the epistoma (Plate I, fig. 6) shows a nearly rectangular median piece not in contact with the head posteriorly but fused with it anteriorly. Its chitinisation is not uniform. This piece is demarked from the lateral arms which end with the dorsal condyle, articulating with the dorsal fossa of the mandible. The epistoma supports the labrum and forms a strong bridge over the oval foramen.

The Hypostoma

The hypostoma (Plate I, fig. 7) is a broad, transverse piece stretching across the ventral and anterior part of the head. Its functions are similar to those of the epistoma. The hypostoma and epistoma, together with the mouth parts attached to them form the boundaries of the oral foramen. The central portion of the hypostoma is striated and less chitinised towards the sides. Its extreme lateral ends provide for the articulation of the mandibles through a fossa (Plate I, fig. 7 V.F) into which fits the ventral condyle of the mandible. Posteriorly, there are two strong, semi-circular apodemes beneath which the cardo of the maxilla is articulated to the maxillary condyle. This is a thickened bar at the posterior edge of the hypostoma. Most

of the cardo and the stipes lie between the hypostoma and the labiophore which is only a continuation of the ventral part of the head, although it is similar in shape to the submentum of many beetles.

The Mouth Parts

The *mandibles* (Plate II, figs 8-10) are prominent, triangular and well adapted for biting. Each mandible terminates acutely at the distal end with the apical tooth. Below this, is the sub-apical tooth which is also pointed. The median tooth is well behind them and is not very pointed. The basal tooth or the molar is broad, and strongly chitinised, constituting nearly half of the inner side of the mandibles. It is used more for crushing than biting. There are four groups of bristles on the mandible.

Dorso-laterally, there are about eight long bristles (Plate II, fig. 8a) arising from a ridge extending along the lateral side of the mandible.

Below and on the same ridge, there is nearly the same number of smaller bristles (Plate II, fig. 8b).

Numerous small bristles (Plate II, fig. 8c) on the lateral aspect run as far as the lateral condyle.

The fourth group of bristles (Plate II, fig. 8d) is dorsal and they vary in length.

The mandible is articulated with the head in three places. At the end of the lateral arm of the epistoma is a globular condyle (Plate I, fig. 6D.C) which fits into the dorsal fossa of the mandible. Laterally, the articulation is made by the long condyle which projects beyond the base of the mandible fitting into a lateral socket in the pregenal area. The ventral condyle is a rounded head which fits into a socket in the antero-lateral ends of the hypostoma.

Each mandible has a large adductor muscle at the base of the molar and a smaller abductor muscle at the base of the lateral condyle. The adductor muscle is darkly coloured near its attachment with the mandible. At the base of the adductor muscle, a small elliptical structure arises and is termed by Hopkins the « pharyngeal process ». It is firmly connected to the mandible and its base is only attached to the pharynx by muscles. Hence, the name « pharyngeal process » does not seem to be appropriate. « Mandibular process » seems to be a more suitable one. It is known as « appendice interna della mandibola » by Russo (1926) in his study of *Chaetoptelius vestitus*; its distal end is covered by elongated papillae. Associated with the mandibles, there is a mandibular gland. This is fairly long, narrow and convoluted, found in both mandibles in both sexes. It is usually found curled up in the pregenal area and liable to be overlooked. The gland swells anteriorly then it ends in a cavity in the base of the mandible. It has a very narrow duct with a row of elongated cells on either side. The nuclei

of the cells are relatively large and peripheral. Mandibular glands are not usually found in Coleoptera. It is probable that they function as salivary glands and through them external digestion might occur to a certain extent.

The *labrum* (Plate I, fig. 5, and Plate II, figs 11 and 12) is quite a distinct organ in all *Anthribidae*, but absent in the majority of Rhynchophora. It is nearly elliptical in shape. Its inner edge close to the epistoma is more chitinised than the distal end.

The labrum is lined ventrally by a membranous epipharynx (Plate II, fig. 12), on which most of the bristles arise. With the labrum the latter forms a double convex structure. On the anterior edge of the epipharynx there are about eighteen strong bristles. Smaller ones of nearly the same number are found on each side, the central area being without any. Dorsally, there is a pair of long hairs on each side and a pair of median short hairs. The latter is on the anterior edge. The clypeus is probably represented by the narrow, membranous structure between the labrum and the epistoma. Hopkins thinks that the anterior margin of the epistoma with the epistomal bristles in *Dendroctonus valens* (which are also present in *Araecerus fasciculatus* De Geer) might represent the clypeus. This view could only be ascertained by a thorough study of the origin of the epistoma and its bristles.

The Labium (Plate II, fig. 13)

The mentum, palpifer, glossa and paraglossa are not found as separate elements in the labium of *Araecerus fasciculatus* De Geer. The mentum as a secondary segment between the prementum and the submentum is not found, but probably one might in this case consider the prementum and submentum as the anterior and posterior parts of the mentum respectively. The prementum is apparently attached to the head between the two lobes of the labiophore. Actually, there is a very small structure hidden between the two which can only be seen by dissection. This is less chitinised than the prementum and probably represents the submentum. As shown in the figure, there is a hole at the base of the prementum through which muscular bands pass to the head. The hidden structure representing the submentum is fused with the head and fits into the base of the prementum.

The labial palpi are quite distinct, with three segments (of which the middle one is small). They are longer than the prementum and the ligula combined. The ligula is situated between the palpi and represents the glossa and paraglossa of other insects. There is a set of long and strong lacinial hairs at the anterior margin. Also, there are several hairs on the ventral side and these extend to the prementum.

The writer has noticed a very abnormal labium (Plate II, fig. 14) in which the ligula and palpi are all represented by a single 3-jointed palpus. The prementum is also much smaller than usual. No abnormality has been noticed in the other mouth parts.

The *maxilla* is a very prominent structure with its relative proportions as shown in Plate II, fig. 15.

The cardo or hinge is the long, narrow basal section and articulates with the maxillary condyle on the posterior end of the hypostoma (Plate I, fig. 7). Its movement is effected by a muscle attached to its basal process.

The stipes is articulated to the distal end of the cardo and is not well defined from the lacinia except that the latter is distinguished by the presence of strong lacinial bristles. It is a blade-like structure with numerous hairs on its ventral surface and fewer hairs dorsally.

The galea is much smaller than the lacinia and joins posteriorly the small membranous area of the subgalea. Most of the bristles of the galea are on the distal end, there being a few on the disc and the inner margin. No bristles are found on the subgalea. The palpifer may be represented by the part of the stipes cut off at the base of the maxillary palpi. The palpi are composed of four segments, connected with each other by flexible membrane. The basal segment is the smallest and lies over the palpifer region. The second is very broad but short. The distal segment is nearly as long as the other three combined.

The Antennae

The antennae (Plate II, figs. 16, 17 and 18) arise in front of the dorsal margin of the eyes and consist of eleven segments forming three groups, differing in size and shape — the scape and pedicel, the club or the last three segments and the funicle in between.

The scape is the first or basal segment of the antenna; it is large and swollen distally.

The pedicel is the second segment; it is smaller than the scape but nearly similar to it in shape. Most of the bristles are on its end where it joins the third segment (Plate II, fig. 17). The third to the eighth segments are much thinner than the remainder and filiform in shape. The third segment is the longest, the fourth to the eighth becoming successively shorter. These are followed by the last three segments constituting the club (Plate II, fig. 18). They are much more chitinised than the rest of the antenna and are thickly clothed with bristles. There is a longitudinal ridge on each side of the club segments. In rare cases the first two segments of the club coalesce at one side.

2. The Thorax

The prothorax articulates freely with the mesothorax and overlaps nearly all its tergal area. On the other hand, the meso- and metathorax are firmly connected in their sternites and pleurites. The dorsal area of the thorax is

nearly as long as that of the abdomen. In the natural position the pronotum or the tergal area of the prothorax is slightly longer than that of the meso- and metaterga combined. The combined length of the abdominal pleurites is greater than that of the thoracic ones represented in the meso- and metathorax. The sclerites are well defined in the metathorax, less distinct in the mesothorax and completely fused in the prothorax.

The Prothorax

The prothorax has the shape of a truncated cone and as in most Rhynchophora its tergal, pleural and sternal elements are nearly fused. There is an indication of a suture from the fore coxa upward, and the intercoxal ridge is divided into anterior portion and a posterior portion, the hairs directed backward and forward respectively. It is nearly $1\frac{1}{2}$ times as broad as it is long; but posteriorly, it is nearly twice as broad as anteriorly. The lateral margins are convergent anteriorly (Plate II, fig. 19). The posterior declivity which according to Hopkins may represent the post-scutellum is bounded by the dorsal and the basal margins (Plate II, figs. 19 and 21). The area enclosed between the two margins of the posterior declivity is narrowed in the centre and is broader at each side. The dorsal carina is much thicker than the anterior margin and in the natural position it is curved in the centre and on each side (Plate II, fig. 19). Laterally, and on each side of the posterior foramen, there is a triangular area which extends as far as the first thoracic spiracle. The lateral end of the basal margin is tubercular and forms one side of the triangular area. The pronotum or tergal area is uniformly reticulated like the head and light in colour, except for very dark, central and lateral areas. Bristles are evenly distributed, one in each mesh of the network.

The ventral aspect of Prothorax

The ventral erea is punctured except in the sternal and intercoxal areas. The pubescence in the former (Plate II, fig. 20) and behind the coxae is short, these hairs being thin; those of sternal area directed backward. The exo-coxal and episternal areas are elevated, whereas the epimeral area is on a lower level and is much flattened. Laterally, between the tergum and the sternum, there is a dark, acute ridge running from the posterior angle for about half the distance to the anterior margin, the « lateral carina » of taxonomists.

The Mesothorax

The *mesotergum* (Plate III, figs. 22 and 23) is very short and narrow when compared with the other tergal areas of the thorax. In the natural

position it is partly hidden by the pronotum and partly by the elytra with only the end of the scutellum exposed between the inner angles of the elytra. The mesotergum is pushed so much forward that its posterior margin lies as far forward as the presternum. It is rectangular in shape and more chitinised than the metatergum; but much less chitinised than the pronotum. It is composed of four parts :

The *prescutum* is a large, subtriangular area occupying more than two-thirds of the total area of the mesotergum and is much better defined than the other divisions. Its anterior margin is concave with the prephragma strongly flexed ventrally. The prephragma (Plate III, fig. 22) is shown in an anterior view. Attached to the prephragma is the intersegmental membrane that joins the mesothorax with the prothorax and in which the first pair of stomata is located. The lateral arms of the prephragma and the prescutum combine and are much produced. The prescutum is divided internally into two equal parts by a longitudinal ridge or apodeme which runs posteriorly as far as the scutellum. Most of the prescutum except the anterior part is covered with characteristic vestiture. The vestiture is composed of small chitinised areas and from each a small thin bristle arises. The lateral areas of the prescutum are strongly flexed. Prescutal lobes are not clear and are probably represented by the slight projection anterior to the lateral arm of the postphragma.

The *scutum* is the oblique area lying close to the posterior-lateral margin of the prescutum and is not well defined from it dorsally. It consists of two areas different in size, an anterior one with bristles on its margin, and a smaller posterior one reaching the scutellum. Both areas have the same vestiture as the prescutum.

The *scutellum* is more clearly defined than the scutum and represented by the median posterior process and two lateral triangular areas. The median process is clothed dorsally with bristles and is the only part of the mesotergum exposed. It lies between the inner angles of the elytra. It is constricted from the rest of the scutellum and is on a higher level from the rest of the mesotergum. The lateral areas of the scutellum are less chitinised than the median part.

The *post-scutellum* is represented by two lateral membranous areas on both sides of the scutum. Each of these areas ends in a long curved hook — the lateral or mesonotal process which Hopkins calls the « lateral arm of postphragma » and probably represents the « yoke plate » of Snodgrass and the « ligamento » of Berlese. Although they are shown in the dorsal aspect of the mesotergum (Plate III, fig. 22) to indicate their position, yet they are always flexed ventrally and are attached to the lateral arms of the prephragma of the metatergum.

The above interpretations differ from those of Snodgrass (1909) in

his study of the mesotergum of *Calosoma scrutator* in which he considers the large triangular area to represent the scutellum. The writer thinks that Hopkins's nomenclature in his study of *Dendroctonus valens* is the more satisfactory. It is the presence of the anterior lateral processes in conjunction with those of the prephragma and also the accessories for the articulation of the elytra that indicate the position of the prescutum. It is doubtful if what Hopkins describes as the « prescutal lobes » correspond to those of the metatergum.

The ventral aspect of Mesotergum

Ventrally, the mesotergum is strongly concave with its lateral areas directed upwards. The concavity fits on the anterior part of the metatergum which is flexed ventrally and is overhung by the mesotergum (as mentioned above in connection with the mesonotal processes). There are two main ridges or apodemes — a transverse and a longitudinal one (Plate III, fig. 23). The former extends anteriorly along the prephragmal area, narrowed in the centre and broad on either side. The latter vertical apodeme is very prominent, and it divides the prescutum into two equal halves and is perpendicular to the transverse apodeme.

The *mesotergum* consists of the presternum and sternum. The *presternum* is represented by the anterior, narrow band in front of the sternum. It is less chitinised than the rest of the mesosternum and in the natural position it is covered by the post-sternal area of the prothorax.

The *sternum* is a broad structure, limited anteriorly by the presternum, laterally by the area representing the episternum and posteriorly by the mesocoxae and the anterior part of the metasternum (Plate III, fig. 24). The intercoxal or sternellar area is elevated with a strongly chitinised edge upon which very small bristles arise.

The *mesopleura* are represented by the episternum (fused with the mesosternum), pre-episternum and epimeron.

The *episternum* is represented by the lateral area fused with the sternum and lies between the pre-episternum and the epimeron. It corresponds in its relative position to the well defined episternum of *Chaetoptelius vestitus* studied by Russo (1926). In *Araecerus fasciculatus* De Geer this area is marked by the definite distribution of the tubercles and pubescence which clothe it more than any part of the sternum. A comparision which other Anthribidae, in which the episternum is distinct, proves that in *Araecerus* it is fused with the sternum.

The *pre-episternum* lies anterior to the episternal area. It is subtriangular with an acute anterior angle which is concave internally making a pocket-like structure. As in most Rhynchophora, it bears what is termed the pre-episternal process (Plate III, fig. 24 P.EPS.P) and in *Araecerus fasciculatus*

De Geer this is fused with the anterior angle of the pre-episternum and joins the first axillary sclerite of the elytra by a ligament. The pre-episternum itself is strongly attached to the first axillary sclerite by a tendon that runs along the inner side of the former (Plate III, fig. 34). It is fused posteriorly with the presternum and episternal area and is marked from them by discontinous line at its base. Powerful muscles join it to the posterior wall of the pronotum.

The *epimeron* is a large triangular piece situated between the metasternum and meta-episternum on one side and the meso-episternal area on the other. The suture separating it from the episternal area is not as marked as the one between it and the meta-episternum.

The Metathorax

The *metatergum* (Plate III, fig. 25) is a large oblong area, placed further forward than the metasternum, so that its middle part lies dorsal to the midcoxa. It consists of the notum and postnotum. The notum is a large plate, convex dorsally. It is called the scuto-scutellum by Crampton. It covers practically the whole segment and to it both the preceding tergum and the wings are attached. It consists of the prescutum, scutum and scutellum.

The *prescutum* (Plate III, figs. 25 and 26) is the anterior transverse section of the notum and is less chitinised than the rest of it. It is the « protergite » of Berlese (1909). It slopes downwards and is more or less vertical anteriorly and is overhung by the mesotergum to which it is attached through a pointed process known as the « lateral arm of prephragma » by Hopkins and the « clavicola » by Berlese. This process is attached to the mesonotal process already mentioned. In the median section and between the two lateral processes there are two prephragmal lobes to which the median metathoracic muscles are attached anteriorly. The prephragma is known as the « acrotergite » by Berlese. On either side of the lateral arm of the prephragma, there is a membrane stretching laterally as far as the anterior notal process and then to the costal area of the wing. The muscle disc lies in this membrane and serves for the attachment of a small muscle which ends in the pleural clavicula. Lying in the membrane between the muscle disc and the lateral arm of the prephragma there is a chitinous rod, hooked on one end, probably corresponding to the « anterior disc » of Hopkins. The prescutum consists of :

(a) Median prescutal area (Plate III, fig. 25 M.PS.A) is nearly semicircular, and is limited anteriorly by the prephragma and posteriorly by the membranous area. Two small triangular pieces arise from it posteriorly.

(b) The prescutal lobes lie on both sides of (a). They are oblong in shape, their anterior angles fused with the lateral arms of the prephragma.

The prescutum continues laterally beyond the prescutal lobes into a

narrow band which is folded internally into a shelf or pocket-like structure bent inwards beneath the anterior scutal lobes. The extreme lateral end of the prescutum is directed posteriorly and forms another pocket or shelf internally. These two folds are dotted in the figures 25 and 26 of Plate III. The anterior notal process (Plate III, fig. 25 A.N.P.) is at the anterior angle of the lateral area. It is termed the « prescutal process » by Hopkins, the « suralar process » by Crampton and the « precondilo » by Berlese. To this process the anterior part of the first axillary sclerite is attached.

(c) The membranous area (Plate III, fig. 25 M.A.) is limited anteriorly by the median prescutal area, antero-laterally by the prescutal lobes, laterally by the anterior scutal lobes and posteriorly by what Hopkins calls the « anterior suture » (dorsally) and « apodeme » (ventrally) and which is termed the « transverse ventral ridge » by Snodgrass.

The *scutum* or the « mesotergite » of Berlese is separated from the scutellum by two prominent oblique apodemes known as the « entodorsum » by Snodgrass and the « median apodeme » by Hopkins and Russo. It consists of two large scutal lobes and two smaller ones which correspond in position to what Hopkins calls « prescutal lobes », thus considering them part of the prescutum. This depends, of course, on their position with regard to the anterior suture or apodeme. However, the writer agrees with Jackson in considering these a part of the scutum, for there is no definite suture between them and the large scutal lobes.

Besides these two lobes, there is a lateral elongated area known as the lateral margin of the scutum. It merges anteriorly into the anterior scutal lobes and is produced laterally into the posterior notal process, known as the « scutellar process » by Hopkins and the « mesocondilo » by Berlese. This process is attached to the posterior part of the third axillary sclerite by a membrane as shown in Plate III, fig. 28. Besides this process, there is another one anterior to it and directed towards the wing. This is not represented in *Dendroctonus valens* or *Sitona hispidula* studied by Hopkins and Jackson respectively. The lateral margin of the scutum is attached to the base of the wing by a membrane which extends anteriorly as far as the prephragma.

The *scutellum* or the « metatergite » of Berlese is the median and more or less triangular area and separates the scutum into two parts. Its central area is known as the median groove and is ridged internally on both sides. It is limited anteriorly by the transverse, anterior apodeme and is not continuous to the end of the notum.

The *postnotum* or the « pseudonotum » is a narrow, transverse structure lying immediately behind the notum (Plate III, figs. 25 and 27). Laterally it expands into a small, anterior and larger, posterior process. The former is attached to the epimeron by a chitinous piece termed by Hopkins the

« metapleural hook » (Plate III, fig. 30) and by a membrane to the base of the wing (Plate III, fig. 28). The larger process expands ventrally and is situated beneath the first abdominal tergite. The lateral metathoracic muscles are attached to the expanded end of the postnotum. From the posterior edge of the postnotum, the postphragma (Plate III, fig. 27) arises and consists of two lobes to which the median metathoracic muscles are attached.

The *metapleura* (Plate III, figs. 29 and 30) differ from the mesopleura in being represented by two definite areas. A more chitinous, triangular piece on the lateral side of the insect represents the episternum. Another less chitinised and in some parts membranous piece lies above the previous one, edge to edge, and represents the epimeron. This is covered by the elytra when they are closed.

The *episternum* consists of two areas, a more chitinised one with tubercles and long bristles similar to those on the sternites, and a much less chitinised dorsal portion. The less chitinised area (Plate III, fig. 29) thins out anteriorly into a chitinous process known as the parapterum and called the « clavicle process » by Hopkins. To this process, the head of the costal vein of the wing is attached by a ligament. What appears to be the posterior end of the episternum, but is really the posterior end of the epimeron is articulated with the distal end of the hind coxa by a ligament, condyle and fossa. There is also a strong ligament between the posterior end of the episternum and the lateral angle of the meta-sternellar area.

What I designate as the epimeron is composed in other beetles, for example Lamellicornia, of at least 3 sclerites. In *Araecerus* all are fused with each other and with the episternum.

The *epimeron* ends anteriorly with a process adjacent and similar to the parapterum. This is known as the wing process, the « coracoid process » of Hopkins and the « fulcro » or « processo alifero » of Berlese. This process is attached to the head of the sub-costal vein of the wing and also to the head of the first axillary sclerite. Between the epimeron and the less chitinised portion of the episternum there is the pleural ridge which also shows internally especially at its posterior end. The posterior end of the epimeron is nearly semi-circular and more chitinised than the rest of the epimeron. To its dorsal edge a chitinous hook is attached (Plate III, fig. 30). As mentioned above, this process joins the epimeron with the anterior process of the postnotum. On the ventral side of the parapterum and some distance from its end a muscle disc arises. This is known as the « clavicle disc » by Hopkins and the « pronator » or the «parapteral disc» by Jackson. It is a large funnel-like structure with a long stalk.

The Metasternum

The *metasternum* (Plate III, fig. 24) is a broad, rectangular area, divided into two lateral areas by a median line which does not quite reach either the anterior or the posterior margin of the sternum. It is limited anteriorly by the mesosternum and the posterior part of the mesopleura and laterally by the meta-episternum.

The *sternum* constitutes most of the area clothed with the bristles dorsally and with tubercles similar to those referred to in the mesosternum ; but these tubercles are not found in the central area. The median line dividing it is ridged internally and is perpendicular to the transverse ridge which lies between the sternum and what Hopkins calls the « sternellar area ».

The *sternellum* and the *sternellar piece* lie posterior to the sternum and constitute a narrow, transverse band. The median area is the sternellar piece. Internally, its median line is ridged adapted for the attachment of the endoskeleton. Below the sternellum lies the hind coxa.

The Endoskeleton

The *endoskeleton* (Plate III, fig. 31) is a Y-shaped structure. It has two anterior arms between which and in the middle line there is a longitudinal ridge or apodeme which in the natural position is directed ventrally. The posterior end fits into the sternellar piece (as already mentioned) and makes an acute angle with it. This results from the articulation of the posterior processes of the endoskeleton into two grooves found on the produced ends of the sternellar piece. Anteriorly, there is a transverse apodeme making an obtuse angle with the longitudinal one and extending laterally to the arms of the endoskeleton. There is another transverse ridge and this with the other ones make two lateral pockets or folds for the attachment of the muscles. The posterior end of the endoskeleton in grooved dorsally.

The Mesothoracic Wings or Elytra

The elytra (Plate III, fig. 32) are wide structures with broad, declivous base, provided with a prominent articulating head or basal process. Both the upper and lower surfaces are chitinised. The former is thick, rough, more chitinised, with bristles and deep sculpture, while the latter is comparatively thin, smooth, leathery and with the sculpturing less distinct.

Sculpture : The striae are the principal features of the sculpture and consist of rows of punctures. Although these are more marked on the upper surface, they are best seen on the inside as tubercles, for the bristles spread all over the upper surface tend to hide them. The interspaces are the longitudinal spaces between the rows of striae or between them and the costal and anal margins. In the elytron of *Araecerus fasciculatus* De Geer there are 11

striae and 12 interspaces. In referring to these, they are numbered beginning from the dorsal suture when the elytra are closed. This corresponds to the anal margin when they are open. The interspace 1 which is called the sutural interspace is elevated at the base and continuous to the apex where it joins interspace 12 or the « costal one ». Interspace 2 is very short and runs from the base for nearly one-third the length of the elytron, where striae 1 and 2 meet. The interspaces 10 and 11 merge for a short distance where the costal groove (which fits into the dorsal margin of the episternum) interrupts their course. Stria 11 passes outside the groove and joins stria 10 some distance from the apex, where they continue as one stria to the apex. Here, this is continuous with striae 1 and 2 combined.

Vestiture : The upper surface of the elytron is covered with dark and light bristles of different diameters but nearly all of equal length and directed towards the apex.

Tracheation : There are five main tracheae running in the interspaces of the elytron giving off smaller branches in the lower surface. They arise from two larger ones coming from the mesotergum. The outer one divides into a short, costal one which does not run far along the costal margin taking the course of the last interspace. The other one runs in the interspace 10 and though much longer, does not reach the apex.

The other three tracheae are branches of the second main trachea and are all long. Their positions as indicated in Plate III, fig. 32, are in the interspaces (1 and 2), 4 and 6. The anal one takes the course of the second then the first interspace.

Articulation of the elytron, mesotergum and mesopleurite : The produced articulatory arm at the base of the elytron is supposed to represent the heads of the costa, subcosta and median veins fused together. The sclerites here (Plate IV, fig. 34) are not quite identical with those of the fore-wing (as it will appear later), and also the relative position is different. The articulation is made as follows :

(a) The *scapular* or first axillary sclerite is similar in shape to that of the hind-wing. Here, the anterior end of the arm joins the lateral arm of the prescutum, its convex base fits the basal process or the articulatory arm of the elytron. Its ventral area is attached to the inner margin of the pre-episternum by a prominent ligament. Laterally, it joins the pre-episternal process.

(b) The *subscapular* or second axillary sclerite is quite different in shape and position when compared with the corresponding one of the hind wing. It lies between the prescutum and the basal process of the elytron but is not directly in contact with the latter. Its anterior arm joins the lateral edge of the prescutum by a ligament. It has two posterior arms. From its centre, there arises a faintly chitinised piece which probably represents the radial plate. This is perpendicular to a club-like plate which stretches to the posterior

margin of the basal process. This club and the triangular area at its base with the faintly chitinised one in between, probably represents the medial plate. Both the club and the radial plate appear vesicular in structure.

(c) The *flexor* plate or third axillary sclerite is quite similar in shape to its corresponding one in the hind-wing. It is a narrow structure with two arms. The anterior one lies behind the posterior end of (b), and the posterior one is attached to the base of the elytron.

The Hind Wings

The wing (Plate IV, fig. 35) is more or less oblong with the costal and anal margins nearly parallel as far as the apex. There are five main veins in the hind wing ; the costa, sub-costa, radius media and cubitus.

The *costa* is separate from the sub-costa at the base of the wing but merges into it distally. As shown in Plate III, fig. 28, its base is attached to that of the sub-costa by a chitinous spur which is seen ventrally lying over the base of the latter. There is another narrow, indirect connection between the costa and the head of the sub-costa. As already mentioned, the head of the costa is attached by tendons to the parapterum of the metapleurum.

The *sub-costa* begins with a prominent base which is attached to both the wing process and to the head of the first axillary sclerite. The sub-costa is considerably swollen at its base. It is only distinguishable from the costa for a short distance and beyond that, the two combine into a single vein along the costal margin of the wing, finally fading away. Between the base of the sub-costa and the second axillary sclerite, there is an elongated plate corresponding in position to the radial plate described by Jackson in the wing of *Sitona hispidula* F. The writer proposes to call it the sub-costal plate as it is far from the radius in *Araecerus fasciculatus* De Geer wing.

The *radius* (Plate III, fig. 28) is very narrow and indistinct at the base where it joins the radial plate. The vein runs nearly half the length of the wing parallel to the costal margin. It then turns towards the margin and just before its termination, a chitinous spur directed towards the base arises. This represents the « recurrent radial » of d'Orchymont (1921).

The *media* runs towards the anal margin of the wing making with the radius an angle of nearly 40°. There is a trace of an incomplete cross connection at the base. There, the media begins to thin out until it reaches the more or less triangular median plate — a large structure that runs posteriorly to the base of the cubitus, and is attached to two other plates of more or less rectangular shape lying between the second and third axillary sclerites. Along the course of the media, there is a prominent chitinous spur directed backwards, representing the « recurrent media » of d'Orchymont. It runs towards the recurrent radial and there is a rudimentary connection between the two.

The *cubitus* is very thin at the base until it reaches the posterior end of the triangular median plate. Most probably, this vein represents CU2, whereas CU1 is represented by its remaining anal portion between the media and CU2.

There is no distinct anal vein. There are no veins in the apical half of the wing, but there are faint dark stripes of which there are two main ones — an anterior one directed towards the apex and a narrow one arising close to the recurrent media and directed towards the anal margin taking the course of M1 in *Dendroctonus valens*. There are two other small ones — one at the end of the media extending to the anal margin, the other begins at the end of the radius and directed towards the costal margin. Except for these stripes and veins the wing is membranous. Of the veins, the radius and media are much chitinised except at the base.

The interpretations employed above in describing the veins are in accordance with those of Jackson and (to a less extent) Hopkins for the venation of *Sitona hispidula* F. and *Dendroctonus valens* respectively. Both *Araecerus fasciculatus* De Geer and *Sitona hispidula* F. are so much specialised in their venation, that it is very difficult to find out the exact relationship between them and the hypothetical type outlined by Graham or even the Cerambycid type which is considered to be the nearest approch to the Rhynchophora.

Chaetotaxy and distribution of «vesicles» on the wing: There are a great number of minute bristles distributed all over the surface except at the bases of the veins and in the radial or median plates. Bristles of different sizes occur and these take definite directions. They are very minute in the anal region, and much more conspicuous and crowded in the apical half of the wing. They are abundant and long along the anal margin but are not found in the basal margin. There is a group of small bristles on the costal vein, much lighter in colour, some of which are more conspicuous than the others.

Besides the bristles, there are minute, rounded, clear bodies, with a double edge. These might correspond to what Jackson (1928) describes as « vesicles » in the wing of *Sitona hispidula* F.. They are found in groups (Plate III, fig. 28) at the base of the wing, mostly on the veins. They are numerous at the base of the radius where they become crowded at one end and are of different sizes. There is another group on the radial plate near the sub-costal margin. Few are found on the sub-costa, but more on the media and about eight of them on the cubitus. Their function is unknown, but they are supposed to be balancing organs.

The *folds of the wing* (Plate IV, fig. 36) : The wing is folded when not in use. The wing is narrowed and shortened by the longitudinal and transverse folds respectively. Longitudinal folds occur between the veins or in the lines of least resistance, whereas transverse ones are found in the apical half of the wing where there are no veins. The longitudinal folds are :

(a) A ventrally-directed anal fold which extends from the base of the anal margin parallel to CU2. The area folded in is triangular and covers most of CU2 and the basal part of the media.

(b) This is made by the apical part of the anal margin being folded dorsally towards the costal margin. This fold precedes the transverse folds (a) and (b).

(c) Sometimes, the part folded by fold (b) is folded again away from the costal margin. This also precedes the transverse folds and is not indicated in the figure. The transverse folds are:

(1) From the end of the radius to the anal end of the media. This fold bends the apical half of the wing ventrally.

(2) Of the part folded ventrally in the previous fold, the apex is folded back dorsally. Sometimes this is followed by the folding back of the apex towards the base of the wing.

The articulation of the Hind Wing

The articulation of the wing is carried out by the axillary sclerites, the anterior and posterior notal processes of the metatergum, the parapterum and wing process of the metapleuron.

The first axillary sclerite (Plate III, fig. 28) is termed the « scapular plate » by Hopkins, the « notopterale » by Crampton and « protero » by Berlese. Its head articulates anteriorly with that of the sub-costa, and ventrally with the metapleural wing-process. The curved part of its arm is attached to the anterior notal process and beyond that is attached to the lateral edge of the prescutum.

The second axillary sclerite is termed the « subscapular plate » by Hopkins and « medipterale » by Crampton and the « mesoptero » by Berlese. It is attached to the 1st axillary sclerite and underlies its posterior part (Plate III, fig. 28). The inner part of this sclerite is less chitinised than the part adjacent to the first axillary sclerite and from it the sub-costal plate runs obliquely to the base of the sub-costal vein.

The third axillary sclerite is termed the « flexor plate » by Hopkins the « basanale » by Crampton and the « metaptero » by Berlese. It is united by its inner end to the large triangular, median plate. Like the other two sclerites, the third axillary sclerite is not uniformly chitinised, its transverse part being more chitinised than the vertical. Besides the triangular part of the median plate mentioned above, it has two other divisions, each roughly rectangular in shape and more chitinised. The median plate connects the second and third axillaries with the bases of the media and cubitus veins; it is not well defined.

The Legs

The legs (Plate I, fig. 1; Plate IV, fig. 37) are large when compared with the size of the body. In *Araecerus* the fore tibia and fore tarsus seem to be sexually different, but such differences are not conspicuous. There is a very narrow space between the procoxae; the mesocoxae are wide apart, being separated by the elevated intercoxal area of the mesosternum and the «intercoxal process» (Hopkins) of the metasternum (Plate III, fig. 24). The metacoxae (Plate I, fig. 1; Plate III, fig. 24; Plate IV, figs. 40 and 41) differ considerably from the other two pairs.

The fore and mid coxa are nearly similar in shape. The former (Plate IV, fig. 37) is somewhat rounded, but with a straight anterior edge to which a strong apodeme is attached. This is represented in the mid coxa as well, but is missing in the hind coxa. At the posterior end of the procoxa there is a transverse groove which is highly chitinised and another, oblique, groove on the outer side.

The mesocoxa (Plate IV, fig. 39) is oblong with its inner surface slightly chitinised and without the transverse groove which is found in the procoxa. The articulation of the coxa with the trochanter is made by a rounded process on the trochanter which fits into a groove on the coxa. The metacoxa is a large, elongated structure with the cavity for the reception of the trochanter near its broad, distal end (Plate I, fig. 1; Plate III, fig. 24; Plate IV, figs. 40 and 41).

The coxa is narrow where it articulates with the posterior end of the meta-episternum through a fossa and condyle in the latter (Plate IV, fig. 41). There is also a strong ligament strengthening this connection. The metacoxa is hollow with less chitinised lateral edges folded inwards especially at the broad end where a strong muscle disc arises, to which the muscles of the coxa are attached. Two transverse sutures run from the cavity for the articulation of the trochanter but they do not reach the proximal end of the coxa. On either side of the posterior suture there are tubercles of the same kind as those found on the sterna of the thorax.

The *trochanter* is the second and the smallest segment of the leg. It is sub-triangular and joins the coxa by means of a rounded condyle that fits into a groove at the base of the coxa. There are strong ligaments between the two. Bristles are mostly found on its inner side (Plate IV, fig. 37).

The *femur* is the third and largest segment of the leg. Its basal end fits into the trochanter. Its distal end is much hollowed out on the underside where it joins the tibia, and this allows the movement and folding of the latter. Along the sides of this hollow, there is a marked chitinisation (Plate IV, fig. 42). The distribution of bristles is not uniform on the underside of the femur.

The *tibia* is nearly as long as the trochanter and femur combined, but

more slender than the femur. It has serrated edges, being spinose especially on its inner side. These are more clear in some specimens than in others. Its base is pivoted to the distal end of the femur and it moves freely into the excavation of the underside of the femur. Its distal end is hollowed out and receives the rounded basal end of the first tarsal joint. The edges of this hollow are armed with very short but strong spines.

The *tarsus* (Plate IV, figs 37 and 38) is composed of five segments which together are longer than the tibia. The first segment, known as the basitarsus, is comparatively long with a slightly serrated surface. It is narrowed at the base where it is articulated with the tibia. The second tarsal segment is smaller but distally broader and with strong bristles, where it joins the bilobed third joint. This segment has a narrow base and the lobes are conspicuous enclosing between them the fourth and the smallest segment of the tarsus and also the basal part of the fifth segment. On the dorsal surface of the lobes, there are long, dark bristles of the same kind as are found on the rest of the leg, whereas the ventral surface is clothed with very fine hairs of a glandular nature as shown in their bases in Plate IV, figure 38. The fifth segment is about as long as the second but is very slender and at its apex there are two claws, each divided on the inside into two parts. Muscles join the inner part of their bases to the fifth segment.

3. The Abdomen

Tergites : In both male and female there are seven external tergites of which six are normally covered by the elytra. The seventh segment forming the pro-pygidium and the pygidium is much more heavily chitinised than the preceding ones. The remaining tergites are not equally chitinised (Plate IV, fig. 43). The first tergum is nearly membranous, while the second is slightly chitinised. The tergites 3-6 show marked, transverse chitinised areas on either side of the median line. The pro-pygidium is similar in both sexes, while the pygidium differs in shape in the male and female. The former is a transverse structure divided into three areas of which the two lateral ones are similar rectangles with bristles on them, the middle area being a grooved trapezium without any bristles. The pygidium in the female is triangular and directed posteriorly (Plate IV, figs 43, 44, 45 and 46) making an acute angle with the seventh sternite. On the other hand, the pygidium in the male (Plate IV, figs 47, 48 and 49) is shorter, rounded posteriorly and perpendicular to the pro-pygidium — the posterior edge being directed ventrally and is close to the posterior edge of the seventh sternite.

Vestiture : (a) On the first and sixth tergites and also on the epipleurites of the first six segments there are numerous papillae directed posteriorly and laterally in the first and sixth tergites and posteriorly in the epipleurites (Plate IV, fig. 43). They are Y-shaped and are so crowded in the sixth

tergum, that they give a striated appearance. A few of them are also found on the tergites 2-5 and they are crowded on the anterior part of the pro-pygidium. They have a light greenish colour.

(b) There are a few, short and stout bristles on the chitinised areas. They are nearly vertical and moderately chitinised. These are not represented in the figure.

(c) On the pro-pygidium there are short bristles arising from a trough-like chitinisation in the posterior half of the rectangular areas (Plate IV, fig. 43).

(d) The most prominent bristles are found on the pygidium. They have narrow bases arising from rounded chitinisations and they are directed posteriorly.

The Pleurites

On the segments 1-6 the epipleural region shows no definite demarcation from the tergites. This region is membranous and on it are situated the abdominal spiracles. These will be described in connection with the respiratory system. The seventh pleurite, in contrast with the preceding ones, is highly chitinised and is not easily distinguished from the pro-pygidium. The epipleurites are shown in Plate IV, fig. 43. The hypopleurites (Plate I, fig. 1) lie below the pleural suture. There are seven hypopleurites of which the first is scarcely distinct from the second. The third to sixth hypopleurites are oblong, while the seventh is triangular. Hypopleurites are, in contrast to the epipleurites, chitinised and well marked from the sternites.

Sternites : In both sexes there are seven external sternites (Plate IV, fig. 50) of which the first two, hidden by the large metacoxa (Plate I, fig. 1) are much less chitinised than the rest of the sternites. The area representing the first sternite is membranous and both segments are without any pubescence. The exposed sternites are equally chitinised and clothed with whitish bristles. The seventh sternite differs in the male and the female (Plate IV, figs 44-49). It is triangular in the female making an acute angle with the pygidium ; whereas in the male it is a transverse strucure, much bent laterally. Its posterior edge is in contact with the posterior and lateral edges of the pygidium which in a lateral view is parallel to it. There is also an internal chitinous band along the posterior edge of the seventh sternite in the male (Plate IV, fig. 50). This is not represented in the female. As the seventh sternite is much bent in the male this makes the sixth sternite different in shape from the corresponding one in the female.

The *internal sternites and tergites :* The eighth, ninth and tenth sternites and terga are internal and differ much in size and shape in the sexes. It is relatively easy to interpret these segments in the male in which the pygidium appears to be the seventh tergite. Inside the seventh segment there

is a complete segment. The eighth sternite is a small transverse structure covered on both sides and along the posterior edge with numerous hairs (Plate V, fig. 51). It lies under the eighth tergite which projects beyond it on all sides. The eighth tergite is membranous. The only chitinisation in the eighth tergite is on its strong lateral margins which extend posteriorly and probably represent pleurites. The rectum opens beneath this tergite. The spicule which is said by Hopkins to represent the ninth sternite is attached to the eighth sternite by its posterior fork (Plate V, figs 51 and 52). It lies under the median plate of the genitalia and functions as an apodeme for the retractile muscles of this plate.

As the above interpretation fits the male, the pygidium in the female should also be the seventh tergite. Posterior to the female pygidium there is a tube through the narrow posterior opening of which project the anal tube and the ovipositor (Plate V, figs 53 and 54). This tube may represent the ninth sternite and tergite. This would place the genital opening very far back, and on this supposition the eighth segment and tergite have disappeared. The sternal side of the tube is much chitinised along the median line but the rest is membranous. There are several hairs on both sides and above the posterior margin. The tergal side shows a slight chitinisation and is membranous along the median line. Laterally, the pleural areas are membranous. A membrane is folded inside the narrow posterior end of the tube and is evaginated when the ovipositor is exserted. The tube has no definite limit anteriorly as the membrane is irregular.

The anal tube represents the tenth sternite and tergite. On its sides there are two elongated supports. These are highly chitinised while the rest of the tube is membranous. The tube is internally attached to the outer tube representing the ninth sternite and tergite by a membrane. The rectum opens at the narrow posterior end of the tube.

Genitalia

The *male genitalia* lie below the gut. As shown in Plate VI, figure 76, it begins anteriorly with a mass of muscles which takes the form of a loop on one side of the ejaculatory duct. The muscles extend dorsally along the median struts and ventro-laterally along the tegmen.

The elements of the male genitalia are represented in Plate V, fig. 57.

(1) The median plate is termed by Hopkins the « body » and according to him represents the tenth sternite. The median lobes constitute the posterior part of the median plate and are termed the « lateral folds » by Hopkins. The dorsal lobe is continuous with the median struts and is broader than the ventral one which is more pointed and projects beyond it. The median orifice is enclosed between the two lobes and through which the ejaculatory duct, the « internal sac » of Sharp and Muir, is evaginated. The median

struts, the « femora » of Hopkins, are prolongations from the dorsal lobe and serve for the attachment of the retractile muscles.

(2) The tegmen is much shorter than the median plate and lies laterally with its central part encircling the median lobes (Plate V, figs 57 and 58). Its posterior end is grooved ventrally (Plate V, figs 58 and 60) and has about five hairs directed posteriorly and several lateral bristles. Dorsally (Plate V, fig. 59), there are several short, stout hairs. The whole surface of the posterior end is covered with short fine pubescence or papillae. The anterior part of the tegmen is a single strut or apodeme for the attachment of the muscles by which the median plate is extended according to Hopkins. The tegmen is supposed by Hopkins to represent the ninth tergit. This can scarcely be the case in *Araecerus fasciculatus* De Geer where the ninth tergite is well marked (Plate V, figs 51 and 52) and moreover, it is usually held that no abdominal tergites or sternites enter into the formation of the genitalia.

(3) The spicule (Plate V, figs 51, 52 and 57) is a ventral rod forked posteriorly where it joins the eighth sternite, and according to Hopkins, it represents the ninth sternite. It is not a part of the aedeagus, but it serves as an apodeme for the attachment of the retractile muscles of the median plate.

The *female genitalia* (Plate V, figs 55 and 56) is simple but much specialised. It consists of a strong but a prominent ovipositor with the vaginal tube on its ventral side. At the posterior end of the ovipositor there is a pair of styli and these are highly chitinised. Each of them bears two long bristles on the inner side and three short spines on the outer side. The « spines » (Plate V, figs 55 SP and 56 SP) are really a short « genital polpus », as in other Anthribids, Cerambycids, etc.. Each stylus has three teeth — a prominent, acute apical one and another smaller, sub-apical, and a third lateral one.

The coxites are a pair of elongated structures, joined together in the middle line and extending anteriorly as three apodemes for almost the entire length of the abdomen. These are two lateral and one median and they serve for the attachment of muscles which control the movement of the ovipositor. The muscles are attached anteriorly to the median part of the anterior apodeme of the metatergite and in front of the median groove.

4. Internal anatomy

The alimentary canal

The alimentary canal (Plate V, fig. 61) is a tubular structure and it runs from the mouth straight into the head and prothoracic regions, but it is slightly curved to the left side of the insect in the metathorax. It is twisted on itself in the anterior region of the abdomen ; then it turns anticlockwise,

proceeding anteriorly and then posteriorly again making a loop in the anterior part of the hind gut. Finally, it continues in a straight line to the end of the rectum. The alimentary canal in *Araecerus fasciculatus* De Geer has the usual three definite regions — the fore, mid and hind intestines. The *fore-intestine* or fore-gut is situated in the head region, the proventriculus being at the posterior end of it. It consists of the pharynx, œsophagus, crop and gizzard or proventriculus. Although it begins with the mouth, there is no special mouth region and it is only indicated by the labrum dorsally, the labium ventrally and the mandibles and maxillae laterally. The pharynx (Plate V, figs 62, 63 and 64) consists of two folds, a dorsal one that proceeds from the internal epistomal region and extends laterally to the lateral arms of the epistoma (Plate V, fig. 63) ; and a ventral fold that extends from the posterior end of the hypostoma (Plate V, fig. 64). Both folds have pharyngeal papillae on their anterior surfaces and these become less laterally. They are directed towards the median line in the ventral fold but are less regular in the dorsal one. The ventral area of the pharynx is supported by two chitinised longitudinal rods which are elongations of the posterior edge of the hypostoma. Perpendicular to these, there is a transverse chitinisation which runs laterally for a short distance and marks the beginning of the œsophageal region.

The œsophagus is a straight tube narrowed posteriorly where it leads to the crop region without any marked demarcation between the two.

The gizzard or proventriculus is a large rounded structure, lying at the posterior end of the head and externally appears brown in colour owing to the denticles inside. In a transverse section (Plate V, fig. 65), it is octagonal in shape with very long denticles arising from the thick chitinous layer lining it. The denticles appear to be long and crowded in the angles of the octagon, short and few on the sides. The epithelium lies outside the chitinised layer and is followed by a thick band of four circular muscles. Outside these lie longitudinal muscles.

A longitudinal section (Plate V, fig. 66) shows the chitinous lining in close contact with the mesentron of the mid-gut posteriorly and with the chitinous lining of the fore-gut anteriorly. In contrast to the epithelium and circular muscles of the gizzard, those of the fore-gut consist of narrow bands.

The *mid intestine* begins from the posterior region of the gizzard and ends where the malpighian tubes arise. Histologically, it shows the following structures (Plate V, fig. 67) :

(a) It is lined internally by elongated cells forming the enteric epithelium. These cells have narrow bases and their inner margins are not well defined. Granular protrusions extend from the epithelial cells to the lumen of the stomach. Some of the epithelial cells are only seen as a group of nuclei and these are regenerative cells occurring only in the tubercular areas.

(b) The epithelium cells rest on a very thin basement membrane.

(c) The basement membrane is followed by longitudinal muscles.

(d) The peritoneal membrane is the outermost layer.

The *hind intestine* begins with four malpighian tubes. These are inserted in a whorl and are evenly spaced round the gut. They are very long and extend to the prothorax and turn back to the loop of the hind intestine to which the narrow ends of the tubes are in close contact. The anterior part of the hind gut forms a loop which in the male lies over the anterior part of the genitalia and in the female, over the apodemes of the ovipositor. The two arms of the loop are parallel to each other and are of small diameter. They represent the ilium and a part of the colon regions.

Histologically, the ilium of the adult of *Araecerus fasciulatus* De Geer (Plate VI, fig. 68) consists of a thick chitinised inner layer, the intima which makes a lining for six large epithelial cells. Each of these is a twin cell with two nuclei but without any definite cell wall between them. These are bounded by one layer of circular muscles, followed by six bands of longitudinal muscles, lying between the epithelial cells. The four malpighian tubes surround the ilium and outside these lie a peritoneal layer. Posteriorly, the histology of the hind gut changes considerably. In the colon region, the intima becomes thicker making pockets on one side but being straight on the other. There are two definite chitinous strands, one on each side. The intima is surrounded by epithelial cells but these are different in shape and arrangement (Plate VI, fig. 69). On one side of the colon lie several layers of circular muscles ; while on the other lie the malpighian tubes which become grouped together. A peritoneal layer surrounds the malpighian tubes and the circular muscles. The rectum is swollen anteriorly where it has two lateral, chitinous U-shaped strands. It thins out posteriorly until it opens under the ninth tergite in the male. It is surrounded by the anal tube in the female and this as well as the ovipositor are surrounded by the tube representing the ninth sternite and tergite, as already mentioned.

As shown in Plate VI, figure 70, the rectum is surrounded with circular muscles and thus differs from the two preceding regions of the hind gut. The intima is very thick and its inner surface is much constricted. Between the intima and the circular muscles, the epithelium is found mostly in pockets. The epithelium cells in the ilium are very different from those of the colon and rectum (Plate VI, figs 68, 69 and 70).

The nervous system

The nervous system of the adult is very much specialised ; the number of ganglia being much less than that of the thoracic and abdominal segments. It is more developed in the head and thorax than in the abdomen, as shown in Plate VI, figure 71.

The nervous system of the head is represented by the brain and the sub-œsophageal ganglion. The brain is well developed occupying a large area in the centre of the head and between the eyes. Dorsally, the brain is covered by a cortex and when this is removed, it is found that the protocerebral lobes are very prominent and occupy the median section of the brain. On either side of these, there is the optic lobe, divided into two parts, of which the outer one is smaller. Its end which lies at the base of the eye, is of a violet red colour, caused by the inner ends of the ommatidia and probably represents the periopticon or the ganglionic layer. The part on either side of the protocerebral lobes is the opticon or the internal medullary mass. From the antero-ventral aspect of the brain the deutocerebrum arises as paired swellings from the protocerebral lobes and gives rise to the antennary nerves. The tritocerebral ganglia are paired swellings on the protocebrum and lie between the deutocerebrum or the antennary ganglia. They give rise to the labral nerves which are more prominent than the antennary ones. Laterally (Plate VI, fig. 72) the brain is joined to the sub-oesophageal ganglion by a broad commissure known as the « para-oesophageal connectives ». The sub-oesophageal ganglion is the ventral ganglionic centre in the head and lies under the oesophagus. It is triangular in shape and from its antero-ventral part three nerves extend on each side to the mandible, maxilla and labium.

The ventral nervous system of the thorax is represented mainly by two ganglia. The first lies in the prothorax and is connected to the sub-oesophageal ganglion by a long commissure, most of which lies in the head. The first thoracic ganglion is triangular in shape when viewed laterally and has one apex directed ventrally. The nerves arising from it innervate the fore-legs. The second ganglion is very prominent, broad anteriorly and narrowed posteriorly. It lies in both the meso- and metathorax. It has three main nerves on either side and innervates the mid and hind legs. The third ganglion of the ventral nervous system is very small and lies over the sternellar piece of the metathorax. Two main nerves extend from it to the abdomen. Hence, this ganglion could be considered common between the thorax and abdomen The last ganglion is large and lies mostly in the fourth abdominal segment. It appears to represent two ganglia in some individuals. Several nerves arise from its posterior end and innervate the reproductive organs and the hind gut.

Reproductive organs

The *female reproductive organs* are situated ventrally below the gut and the ovipositor. The latter lies over the central portion of the reproductive organs. They are comprised (Plate VI, fig. 73) of the ovarioles and their terminal chambers, paired oviducts, unpaired oviduct or uterus, bursa copulatrix, spermatheca with its duct and gland, and lastly the vagina. There are five ovarioles on each side of the ovary in which the eggs are disposed in a

chain with the oldest cocytes near the unpaired oviducts. There are three well marked zones for every ovariole :

(a) The terminal filament which lies anteriorly and unites with the filaments of the other ovarioles and form a common thread which supports the ovarioles.

(b) The germarium or the terminal chamber which is an elongated structure of granular nature and lies below the filament. From it, small oocytes are budded off and move to the oviduct where they mature.

(c) The vitellarium is the region containing the developing eggs and constitutes the major part of the ovariole. This portion does not exist in the newly emerged adult (Plate VI, fig. 74). It begins to develop three days after emergence.

There are two oviducts leading from the ovaries and they unite posteriorly into a common duct or uterus ; and this has a larger diameter than either of the paired ducts. Although the paired ducts are narrow, the wall is capable of much distension as mature eggs of much larger diameter than the ducts are often seen lodged in them. The common duct is not entirely membranous ; transverse striations and numerous projections are present (Plate VI, fig. 75).

The bursa copulatrix is a prominent conical structure. It runs obliquely as a diverticulum from the oviduct. Its anterior end is pointed and has strong muscles attached to it. The bursa copulatric is thick walled and has two lateral chitinisations on the inner side.

The spermatheca is a kidney-shaped structure, small, chitinised and thick-walled. Attached to it externally there is the spermathecal gland. Also there is a spermathecal duct which runs from one end of the spermatheca to the angle between the bursa copulatrix and the uterus.

The vagina narrows posteriorly and runs below the ovipositor and is enclosed by the membrane that underlies the posterior part of the ovipositor (Plate V, fig. 60).

The *male reproductive organs* (Plate VI, fig. 76) occupy the same position as those of the female. The testes lie ventrally on either side of the gut and are kept in position by the surrounding fat bodies and tracheae. The accessory glands are convoluted in the body cavity. There is a pair of testes on each side. These are somewhat rounded and have seven or eight lobes when mature. They are not always uniform in shape and size. A vas deferens arises ventrally from each of the four testes. These run posteriorly, and join to form a pair of single ducts, the anterior parts of which are greatly enlarged. The main vas deferens of each side ends medially in the vesicula seminalis, the surface of which is many-lobed. On either side of it, a pair of accessory glands of considerable diameter arise. Also, a narrow, common seminal outlet or tube leads posteriorly to the ejaculatory duct. The junction of this tube with the vesicula seminalis is paired at the base, probably suggesting that the vesicula

seminalis was also paired originally. The junction of the seminal tube with the ejaculatory duct is surrounded by strong muscles.

The ejaculatory duct (Plate V, fig. 57; Plate VI, fig 76) is large and narrows out posteriorly where it ends between the dorsal and ventral lobes of the median plate. At its anterior end, there is a prominent armature of denticles and papillae. The denticles are five. There are two lateral, hook-like structures, highly chitinised and their chitinisation becomes less as they proceed anteriorly. In the median section of the dorsal wall of the duct is a pair of oblique denticles making an acute angle with the inner surface. Between these and the hook-like denticles, there is a median transverse plate lying vertically on the inner wall of the duct. The papillae are not uniform in this region and they occupy a much greater area than the denticles. Some of them are V-shaped, others are elongated and some are slightly rounded. When the ejaculatory duct is everted during fertilization, this region is inserted into the female, while the major part of the duct is not introduced. The base of this part of the ejaculatory duct which is exserted during fertilization is supported by the dorsal and ventral lobes of the median plate which maintain their relative position (during fertilization). The tube is supported ventrally by the end of the tegmen. The rest of the tegmen (the basal piece) as well as the median struts and the spicule remain internal.

The circulatory system

The circulatory system consists of the heart and the dorsal aorta. It occupies the median, dorsal line of the body-cavity and extends from the seventh abdominal tergite or propygidium as far as the brain. The heart is the posterior part of the circulatory system and it has six chambers. It lies beween the longitudinal muscles on the ventral side of the second to seventh abdominal tergites. The relative position of the chambers does not coincide with that of the corresponding tergites (Plate VI, fig. 77). Every chamber lies in two tergites. The chambers are narrowed as they proceed posteriorly. The posterior chamber is comparatively small and lies mostly under the propygidium. The heart is a colourless, membranous, flattened tube. Its wall is muscular and encloses scattered nuclei (Plate VI, fig. 78; Plate VII, fig. 79); where these occur, the wall is somewhat enlarged. It is surrounded by a pericardial membrane with small pericardial cells. Outside the wall of the heart, there are larger «pericardial nephrocytes» which in contrast to the fat bodies are not vacuolated. On either side of the heart, there are alary muscles, attaching the heart to the tergites. On both sides of the heart fat bodies are regularly arranged.

The dorsal aorta runs from the second abdominal tergite to the head. It is much enlarged behind and it thins out as it extends anteriorly. Its posterior part in the first and second abdominal tergites is close to the integu-

ment, whereas, in the meso- and metathorax it lies under the longitudinal muscles. It has a double wall as in the heart and it is easier to dissect for it has no fat bodies round it.

The respiratory system

There are nine spiracles in the adult, two of which are in the thorax and the rest in the abdomen as illustrated in Plate VII, figure 80. The first thoracic spiracle lies laterally in the membrane that joins the prothorax to the mesothorax. The spiracles themselves are lodged in the prothorax and lie anterior to the lateral areas on either side of the posterior declivity (Plate II, fig. 21). The second thoracic spiracle is situated laterally between the meso- and metatergites. The thoracic spiracles are larger than the abdominal ones except the first abdominal. There are seven spiracles in the abdomen of which the first is very prominent, while the last which is situated in the propygidium is very small (Plate I, fig. 1; Plate IV, fig. 43; Plate VI, fig. 77; Plate VII, fig. 80). The spiracles in between are of equal size and equidistant from each other. All the spiracles lie in the epipleural area which is membranous, except in the seventh segment where it is chitinous and fused with the propygidium (Plate VI, fig. 77).

There are two lateral trunks in the meso- and metathorax and in the abdomen, one on either side. The trunks are only doubled in the prothorax and the head, where there is a dorsal and ventral trunk on both sides. The second thoracic spiracle does not lie on the main course of the lateral trunks.

The *tracheal system of the head*: The dorsal trunk of the prothorax runs to the posterior part of the head and from the transverse connection joining the two dorsal tracheae, a median one runs perpendicularly above the fore-gut and bifurcates anteriorly into two main tracheae which branch in turn into smaller ones running into the muscles and the mouth parts. Very fine tracheae are seen in contact with the brain. The ventral tracheal system is a continuation of the ventral trunk of the prothorax which extends into the head with a cross or a transverse connection under the oesophagus. Anteriorly, the trunks bifurcate and each trachea branches in turn into smaller treacheae which run into the muscles, sub-oesophageal ganglion and the mouth parts.

The *tracheal system of the thorax*: The dorsal and ventral trunks of the prothorax begin their course from the first thoracic spiracle. They run obliquely to the head. The ventral trunk is straighter and from it lateral tracheae branch into the muscles. The branches of the dorsal tracheae run into the central part of the prothorax and are in contact with the dorsal muscles and the gut. Besides these two trunks, two other tracheae run from the spiracle and branch in the muscles laterally.

The tracheal system of the mesothorax is represented mainly by the lateral

trunks which are short and nearly ventral. Three tracheae arise from the second thoracic spiracle, of which the anterior one gives rise to the tracheal system of the elytra.

The tracheal system of the metathorax is represented by the main lateral trunks which run into the lateral muscles. From the trunks the trachaea branch into the longitudinal and lateral muscles. From the first abdominal spiracle arises a large trachea, the basal part of which can be seen through the dorsal integument. It has three branches running into the lateral muscles of the metatergum, the hind wing and the metapleurite.

The *abdominal tracheal system* differs from the thoracic one in having a regular distribution. The dorsal system consists of very fine tracheae arising from the spiracles and running across the longitudinal muscles of the abdomen. The tracheae bifurcate along the median part of the tergites and on both sides of the heart. The ventral tracheae are more prominent and branch a great deal into the muscles, the gut and the reproductive organs. In each segment they all originate from a main trachea coming directly from the spiracle of that segment (Plate VII, fig. 80). Only the bases of these tracheae are shown in the diagram.

D. MORPHOLOGY OF THE EARLY STAGES

1. The Egg

The egg (Plate VII, fig. 81) when first laid is transparent white, glistening, usually ovoid in shape, in few cases elongated and cylindrical with both poles similar, or very short with broadened ends. The average length of the egg is 0.565 mm. and the width is 0.323 mm. Twenty-five eggs were measured. The surface of the egg is not smooth but covered with small, rounded pits and these are irregularly arranged. The empty egg shell is quite colourless and very transparent.

The eggs of *Araecerus fasciculatus* De Geer are supposed to have been first described by S w e z e y (1920-1921). He mentions that they are short, cylindrical, deposited in masses of 40-60 eggs adhering together and are 0.8 mm. long and 0.4 mm. broad. Moreover, he describes the surface of the egg as covered with pits arranged in longitudinal rows. Also he mentions that the eggs become yellow before hatching and that the empty egg shell is pure white.

It will appear later that the maximum rate of egg-laying is never more than 6.7 eggs per day (for a female that has been kept from pairing for three weeks), and that under normal conditions the average rate is much less than that. The eggs of *Araecerus fasciculatus* De Geer are laid singly and never seen adhering together or even in close contact with each other. Consequently, the writer is fully convinced that S w e z e y was under some mis-

apprehension ; the eggs he describes cannot have been those of *Araecerus fasciculatus* De Geer.

The length of the egg measured by Autori (1931), namely 0.59 to 0.62 mm. and the breadth measured by Cotton (1921) (0.35 mm.) are greater than the writer's measurements. Autuori has described the shape as elliptical and becoming «less spherical» later on.

In the writer's experiments the eggs were laid in the grains of the ordinary Indian maize, usually, in the endosperm which is soft and fleshy or in the powdery part that lies beneath it. They are never laid in the «scutellum» or the hard part of the grain. In most cases, they are found 3-4 mm. deep, although sometimes they are near the surface. In cacao they are found mostly in the crevices or wrinkles of the cotyledon, whereas in nutmeg their position is not limited except that they are usually not deep. One can in most cases distinguish the ordinary feeding bite of the mandibles from the boring of the ovipositor. There is always a very fine dust on the surface indicating the position of the hole made by the ovipositor even if the hole had been obliterated. The fine particles in the case of maize are white in colour lacking the dull appearance of the endosperm.

2. Hatching mechanism

There is no special hatching mechanism for the egg. One day before hatching, the mandibles of the first stage larva appear as two red spots at the cephalic pole of the egg. The larva bites its way through the chorion by its mandibles. Eclosion is also effected by its wriggling inside the shell. After hatching the first stage larva remains within the open shell for a few hours; in some cases this period is prolonged to nearly 20 hours.

3. The larval moults

The larval moults are first referred to by Cotton. He states that they are five, but there is no reference to temperature, humidity or food. The writer finds, however, that the number of moults is variable at 90% relative humidity on maize. In most cases, it is four and rarely three or five. Out of 22 larvae, 17 had four instars, 3 had three instars and 2 had five instars. Both sexes were represented in the three cases.

Usually, the first instar takes 5-7 days and the second has a shorter period. The third instar is usually about the same as the first one, while the fourth is variable. When there are only three instars, the periods of the three instars are about 7, 15 and 10 days respectively. In this case, the second instar is about twice as much as the first. When the larva has five instars the first and second instars are about equal to those of the four instars larva, the third nearly as the first two instars combined, while the fifth is about as much as the third and fourth combined.

The data for the three and five instars larvae are not reliable as the number of these larvae is very small. in all cases Dyar's law, namely, the head-width of the larva follows regular geometrical progression in successive instars, does not hold good in the larva of *Araecerus fasciculatus* De Geer.

4. External anatomy of the larva

According to Boving and Craighead (1931) the larva *Araecerus fasciculatus* De Geer is of the *Byrrhidae* type of the Polyphaga — a much less primitive type when compared with the other two, namely. *Staphylinidae* and *Cucujidae*, the former being the most primitive.

The mature larva is 5-6 mm. long. Its body (Plate VII, fig. 82) is curved and wrinkled with the thoracic region enlarged and the head comparatively small. It is whitish in colour. The thorax is nearly one third as long as the abdomen. The prothorax is much broader than the head which merges into it ventrally. The larva is legless except for the presence of semi-globular pedal lobes or large thoracic swellings which are more prominent in the pro- and mesothorax. It is strange that Lucas (1861) described *Araecerus fasciculatus* De Geer larvae as having well developed legs. Swezey (1920-1921) also states that the larva has legs. The tergal, sternal and pleural divisions are well represented in the thorax and the abdomen. The tergal divisions are broad and occupy half the circumference. There are three thoracic and ten abdominal segments, of which the last is tucked into the preceding segment. The divisions and wrinkles of the abdominal segments are not represented in the last two segments which are without spiracles. The body is fairly well covered with fine hairs which are found mostly in groups and are more numerous on the ventral side of the thorax.

The Head

The head (Plate VII, figs 83, 84 and 85) is rounded in shape, longer than broad (in the ratio 7 : 5). It is almost a pale straw colour except directly after moulting when it is white. The mouth parts, especially the mandibles and their articulations, also the epistoma and to a less extent the frontal area and the antero-lateral margins are much darker in colour than the rest of the head.

The primary elements in the adult head are well represented in that of the larva except that the clypeus is well defined in the larva.

In all the larval instars, the head is as broad as the distance between the epistoma and the base of the epicranium. The epicranial suture is twice as long as the epistoma ; it is lighter in colour than the rest of the epicranium. Cotton describes « two longitudinal, light stripes, rising from the frontal sutures and running to the base of the head ». In the writer's opinion these

« stripes » are only dorsal tracheae and could not be seen in boiled specimens They are not quite straight and branch into fine tracheae.

Mouth parts

The *labrum* (Plate VII, fig. 86) is a prominent, pentagonal structure with two posterior arms. It is broader than long and has the anterior margin lobed. It is much more chitinised than the clypeus. Its vestiture is more symmetrically arranged than in the adult. Dorsally, there are four pairs of long hairs, three of them are antero-lateral, while the fourth lies on the median line anteriorly. On the ventral or epipharyngeal side, there are two pairs of short, thick bristles, between which two or three fine bristles can be seen (in some specimens more clearly than others). Anteriorly, there are two fine bristles. Also, there are a few papillae along the margin; these are not clear in some specimens. Autuori describes « four hairs in the median section of the upper side and one on each side near the external angle ». The labrum is attached to the clypeus by a membrane. Posteriorly, its arms, known as the epipharyngeal rods, are attached by muscles to the roof of the mouth.

The *mandibles* (Plate VII, 87 and 89) are stout, triangular and tridentate. The apex is produced into an acute, apical tooth. On the inner edge. below the apical tooth, is the sub-apical one, followed by the median tooth. The rest of the inner margin is the molar surface which is slightly grooved or depressed anteriorly. Dorsally, there are two long bristles of unequal length. The dorsal articulation is through a condyle at the lateral end of the epistoma (Plate VII, figs 84 and 86) fitting into a fossa on the mandible. In the ventral articulation (Plate VII, fig. 89), the condyle is borne by the mandible itself and fits into a fossa close to the termination of the hypopharyngeal bracon. The large adductor muscle lies at the base of the molar surface, whereas the small abductor is attached to the outer, basal angle.

The *maxillae* (Plate VII, figs 85 and 88) are narrow, elongated structures lying on both sides of the labium and fused with it. The cardo is quite distinct and slipper-like. Its posterior end is much narrowed and attached by a ligament to a small, triangular condyle on the lateral ends of the tentorial bridge. Anteriorly, the cardo is attached to the base of the stipes by a membrane. Cotton refers to « a stout chitinised seta on palpifer just below the maxillary lobe ». The palpifer, an outer lateral sclerite borne by the stipes, does not seem to occur in the larva of *Araecerus fasciculatus* De Geer. The inner margin is produced into a well chitinised, distinct spine, which represents a lacinial lobe and it is to this, probably, that Cotton is referring. This lacinial tooth is far from the region where the palpifer would occur. The outer side of the maxillae is terminated by a two-segmented palpus and is telescopic. The basal segment is thick and partly buried in the stipes. The distal segment is narrow and has papillae on its end. Between

the maxillary palp and the lacinial spine, there is a lobe with strong bristles on its inner margin. Similar bristles are found at the base of the lacinial spine. There are about twenty long hairs scattered on the stipes especially on its outer margin, but none are found on the inner margin.

The *labium* (Plate VII, fig. 85; Plate VIII, figs 90 and 91) is a broad. transverse structure, lying between the inner margins of the maxillae and fused with them. Its form is quite different from that of the adult. The sub-mentum is very broad and is directly connected posteriorly with the sternal region of the prothorax. It is also directly connected with the cardo, and by a lateral lobe on each side, with the stipes. The mentum is rounded and convex. It forms with the pre-mentum a dome-like structure. There is no definite suture between the mentum and the sub-mentum as indicated by Cotton. Each of the labial palpi has one well-defined segment fused at its base with the pre-mentum. Cotton has described the palpi as two-segmented, but the writer can find nothing to suggest this. However. his figure of the labium does not show clearly two-segmented palpi. Autuori (1931) also describes two segments and states that they are of equal length. Gardner (1932) in his « Immature stages of Indian Coleoptera: Anthribidae » describes the labial palps of *Araecerus suturalis* Boh. as one-segmented and suggests that the basal segment referred to by Cotton in his description to the labium of the larva of *Araecerus fasciculatus* De Geer is fused with the pre-mentum.

Anterior to the pre-mentum and ventrally, lie the fused ligula and hypopharynx. Their anterior edge is lobed, and has several setae (Plate VIII, fig. 90). Laterally, there are numerous, acute papillae, becoming larger towards the median line. In the pre-mentum there are three hairs on each side — two of them behind the palpus and one at the base. In the mentum there are two long hairs — one on each side, arising posteriorly. The sub-mentum bears a pair of long median hairs and about 16 hairs on its lateral articulation with the stipes. These are not usually « four groups of four each end » as Cotton states, but rather three anteriorly and five posteriorly. Besides these hairs on the lateral sides of the sub-mentum, there are several acute papillae on the anterior end. Behind the hypopharyngeal region (Plate VII, figs 84 and 89; Plate VIII, fig. 90) there is a strong chitinisation known by Boving and Craighead as the « hypopharyngeal sclerome ». This is not uniformly chitinised, its medium section being more chitinised than the lateral angles. The sclerome is continued laterally on both sides by what is known as the « hypopharyngeal bracon » which ends at the epicranium close to the ventral articulation of the mandible. The hypopharyngeal chitinisation is forked into two processes which in the natural position are directed anteriorly (Plate VII, fig. 84). Between the strong chitinisation of the sclerome and the processes there is a cavity. The processes function as apodemes for supporting the pharyngeal muscles.

The *clypeus* (Plate VII, fig. 86) is an oblong, membranous structure. It is twice as broad as long and pre-epistomal in position. It is as broad as the labrum and its anterior margin overlaps the posterior one of the latter. The basal margin of the clypeus is rigidly connected to the epistoma. The sides are nearly straight with the anterior angles slightly obtuse; the basal angles being acute and produced towards the dorsal articulation of the mandible.

The *epistoma* (Plate VII, figs 84 and 86) is a narrow, transverse, chitinised area at the base of the clypeus and extends laterally to the dorsal condyle which fits into the dorsal fossa of the mandible. Its chitinisation is not uniform, being greater at the dorsal condyle. Internally, its median part at the base of the clypeus ends in two projections or processes which serve for the attachment of the pharyngeal muscles. They are more chitinised than the central area.

The *front* is posterior to the epistoma and is not marked off as the frontal sutures are very short.

The *epicranium* is represented by the large dorsal lobes on either sides of the epicranial suture; these merge into the occipital and genal areas.

The *occipital foramen* (Plate VII, fig. 85) lies in the ventral and posterior part of the head. It is very large compared with that of the adult. It is bounded laterally by a broad tentorial rim which narrows as it extends posteriorly. Anteriorly, it is limited by the tentorial bridge which forms the anterior part of the endoskeleton. The occipital apodeme lies beneath the posterior end of the epicranial suture.

The *thoracic and abdominal tergites, sternites and pleurites:* The pronotum (Plate VIII, fig. 92) is not divided; but the meso- and metathoracic terga show two dorsal divisions and a short lateral one extending to the alar area where the mesothoracic spiracle is located. The regular arrangement of the wrinkles in the thorax and abdomen has led Cotton, Hopkins and others to give these the same names adopted for the divisions of the thorax and abdomen of the adult. The writer does not share this view for two main reasons. The first is that these divisions are not marked by definite sutures as in the adult. The second is that it is hard to trace any homology between these divisions and those of the adult unless a further study is made to find a relationship between the larval and pupal segments on one hand and the pupal and adult segments on the other. It appears, therefore, perhaps better to use the terms, « alar area » where spiracles are located, « coxal lobe » where legs would arise if they were present, « epipleuron and hypopleuron » for the two tubercles between the alar area and the coxal lobe, and « eusternum » for the ventral areas of the thorax and abdomen. These terms are only used on account of their relative positions and to make the systematic description possible. As to the tergal divisions, it seems better to avoid the terms used in the adult.

The tergum in the abdomen (Plate VIII, fig. 93) consists of two transverse lobes or divisions. The first, or anterior division is characterised by the presence of short, contiguous tubercles, arranged regularly, one beside the other, and clear only on the first five abdominal tergites. After that, they become obscure and do not exist on the last three segments. They are similar to those of *Araecerus suturalis* Boh. described by Gardner (1932). Besides the two tergal divisions of the abdomen, there is a short, triangular, lateral one which merges into the alar area. According to Cotton, all the tergal divisions of the adult are represented in the thorax and abdomen of the larva of *Araecerus fasciculatus* De Geer. He maintains that the « scutum » and « scutellum » are fused in the meso- and metathorax. The lateral aspect of the abdomen clearly shows three lobes, two triangular ones and a slightly elongated one between them. These may represent the epipleural, hypopleural and coxal lobes. Ventrally, between the coxal lobes of each side, the eusternum stretches undivided.

The number and arrangement of the tergal divisions in the meso- and metathorax is similar to those of the abdomen (Plate VIII, fig. 93). The lobe representing the hypopleuron in the abdomen is missing in the thorax. There is no alar area in the prothorax and the pleural area is represented by a large lobe on either side of the pronotum and a very small one behind it.

5. Internal anatomy of the larva

Alimentary canal

The alimentary canal (Plate VIII, fig. 94) is a tube actually longer than the body of the larva and much coiled in the abdominal region. The fore-gut is straight and narrow when compared with the mid-gut. It begins with the mouth region, marked by the labrum above and the labium below. Internally, there is the epipharynx lining the labrum and the hypopharyngeal region which is fused with the ligula. The œsophagus runs posteriorly between the anterior fork or processes of the hypopharyngeal chitinisation (Plate VII, fig. 89). Its posterior end is slightly enlarged and represents the crop area. The gizzard, unlike that of the adult, is not well defined and does not show any marked chitinisation. It lies in the prothorax, whereas the gizzard of the adult lies at the posterior end of the head. There are two long salivary glands, one on either side, opening ventrally on each side of the labium. Each has a narrow, central duct and is lobed on both sides except at its base which is pressed to the oesophagus.

The mid-gut starts in the mesothorax and is dull white in colour, in contrast to the clear, transparent fore-gut. It is coiled as in the figure and ends where the four malpighian tubes originate. These are found in a whorl and are equally spaced around the gut. They are more translucent in colour than those of the adult.

The hind-gut differs from that of the adult in being uniform, differently coiled, and without external chitinisation.

The nervous system

The ventral nervous system (Plate VIII, fig. 95) forms a long chain which runs along the median, ventral line and can be seen through the skin of the larva. The nervous system of the head is represented by the brain and the sub-oesophageal ganglion. The brain lies over the oesophagus and consists of two triangular lobes with a narrow connection between them. From the anterior part of the brain two main nerves, one on each side, proceed anteriorly and innervate the mouth-parts. The brain and the sub-oesophageal ganglion are connected by para-oesophageal connectives on either side.

The thoracic and abdominal segments nearly all have separate ganglia. In most individuals, the metathoracic and first abdominal ganglia coalesce into one which is usually elongated and constricted. The last two or three ganglia also coalesce into a large, triangular one. The size and shape of the ganglia differ in the mature larvae. They may be rounded and fairly large or narrowed and elongated. The commissures joining the ventral ganglia are clearly in pairs.

The respiratory system

The respiratory system (Plate VIII, fig. 95) consists of two main, lateral trunks, one on either side. There are nine spiracles, one thoracic and eight abdominal ones. The thoracic spiracle lies in the mesothorax and close to the prothorax. Lefroy (Indian Insect Life, 1909, p. 380) mentions *Araecerus fasciculatus* De Geer or one of its allied species as a cotton seed pest. In his illustrations, the thoracic spiracle of the larva is located in the prothorax. If the drawing is accurate, the cotton seed pest must be another insect. Autuori draws the mesothoracic spiracle very close to the metathorax. The illustration of Cotton, Boving and Craighead and the writer's agree as far as the position of the thoracic spiracle is concerned. As shown in Plate VIII, figure 96, the mesothoracic spiracle is biforous, the two openings being directed dorsally. The openings are independent, with no common wall in between. The thoracic spiracle is considerably larger than the abdominal ones. The latter (Plate VIII, fig. 97) are uniforous with their openings directed dorsally.

From every abdominal spiracle four main tracheae arise. These are one dorsal, one ventral and two lateral. The ventral tracheae are very thin and are represented in the figure by a line. They lie over the ventral muscles and branch in their distal ends into fine tracheae which surround the ganglia and the commissures between them. The other three tracheae are about equal in diameter. The dorsal one runs in the tergal area, while the two lateral ones

run into the body cavity and branch in the fat bodies and round the alimentary canal.

Although there is only one thoracic spiracle, yet the tracheal system in the thorax is well represented. About seven main tracheae arise from the thoracic spiracle. Two of these tracheae proceed to the head. The inner one is ventral and branches into two before it gets to the brain. It divides again ventral to the brain. The outer one is dorsal and has several, small branches. It is probably these that Cotton described as « longitudinal streaks » as already mentioned. The other tracheae from the thoracic spiracle run dorsally, ventrally and laterally. The ventral one is not fine as it is in the abdomen. Between the thoracic and the first abdominal spiracle there are four tracheae arising from the main trunk in two places. The ventral one of the metathorax is similar to those of the abdomen, being very fine.

6. The Pupa

Pupation

Just before the pupa is formed, the thorax and abdomen of the larva become of equal length. The abdomen tapers posteriorly. The tips of the wings are sometimes seen protruding through the larval skin at the posterior and lateral ends of the metathorax. Dorsally, the thoracic region is constricted from the abdominal one.

The pupa (Plate VIII, figs 98-101) is from 3.78 mm. to 4.57 mm. long (average = 4.12 mm.) and from 1.92 mm. to 2.37 mm. broad (average = 2.12 mm.). Twenty pupae were measured. Cotton's measurements are from 3.75 to 4 mm. long and 2 mm. wide. Autuori's measurements are 4.57 to 5 mm. for the length and 1.5 to 2 mm. for the width. Lucas overestimates the length (5 mm.) and underestimates the breadth (1.75 mm.). The pupa when first formed is white and translucent with no sign of chitinisation except at the pointed tips of the elytra. These are hook-like reaching the sixth segment of the abdomen. Lucas describes the colour as being testaceous and turning brown when the adult is about to emerge. The first sign of chitinisation appears faintly in the bulla of the eye two days after pupation. This is followed by the darkening of the apical ends of the mandibles which become reddish in colour. The sternites are the last part of the body that become chitinised, becoming so only in the very mature pupae. The head, pronotum, antennae and tarsi are the most heavily chitinised parts in the mature pupa. As a rule, the last larval skin is seen clinging tightly to the last three abdominal segments. This affords a good protection for these segments which are very transparent, even in the mature pupa. In the majority of cases, the pupa dies if the larval skin is removed in the early stages of pupation. The pupa is very active and moves its abdomen quickly in a circular motion. The head (Plate VIII, fig. 99) is bent ventrally and is rounded anteriorly. It is

overlapped dorsally by the anterior part of the prothorax. Lucas describes a longitudinal furrow traversing the head in its median line. The writer could not trace a furrow of any sort on the head. The mouth-parts as a whole are short, broad and lie almost over the sternal area of the prothorax. The labrum is triangular in shape differing from that of the larva and the adult. It is also elongated and covers most of the mandibles. It is not narrowed posteriorly as in the adult but is much broadened, extending nearly to the lateral ends of the epistoma. The ligula and the ends of the maxillary and labial palps are seen protruding beneath the mandibles. The tips of the labial palps are nearly as long as the ligula. Both the labial and maxillary palps are narrowed at their ends and do not show any clear segmentation. The antennae arise anteriorly to the eyes and appear nearly filiform in the newly formed pupae. They are folded over the back with their tips on either side of the rounded end of the meso-scutellum. In the newly formed pupa the segments of the antenna are not clear. The club area shows the segmentation more than the rest of the antenna and in this area chitinisation begins earlier and becomes very deep in the mature pupae. Lucas states that « the antennae are yellowish and lie longitudinally between the prothorax and the fore-legs. The last joints are pressed to the centre of the femora of the mid legs ». The eyes are nearly kidney-shaped and not oval as described by Lucas and Autuori, nor rounded as illustrated by Lefroy. There are several long hairs on the exposed part of the epicranium but none in the frontal area.

The dorsal aspect

The pronotum (Plate VIII, fig. 98) has the same truncated shape as in the adult. It is also bisinuate in its posterior margin. It is the first part of the thorax to show chitinisation, being covered by long, whitish hairs which become brownish later. On the meso-and metaterga there are two groups of hairs. These are more crowded on the mesotergum and are of different lengths. The lateral edges of the median groove show the first chitinisation in the metatergum. As in the adult, the first abdominal tergites are similar; all are narrow, transverse bands. The median dorsal line is clear along them. On both sides of it, there are a few hairs in each segment and there are also hairs on the lateral sides. The seventh tergum is very large and triangular in shape (Plate VIII, figs 98 and 100). It is slightly longer than the seventh and eighth sternites combined. The pro-pygidium and pygidium of the adult are seen in the mature pupa arising under the seventh tergum of the pupa. The demarcation between the seventh and eighth terga is not clear and appears only as a wrinkle. The ninth tergum is very narrow and expands laterally into a triangular process which has two lobes at its distal end. Papillae are found on these processes. The tenth tergite is very small and is tucked into the ninth. The last two segments in Autuori's illustration

of the pupa are not clear. The processes of the ninth segment are lacking in Autuori's figure. There is no reference to them in Lucas's description.

The ventral aspect (Plate VIII, fig. 99)

There are three distinct regions in the legs, namely, the femur, tibia and tarsi. The last do not show any segmentation except where the claws of the adult arise. This segmentation is clearer in the hind leg than either the fore or the mid-leg. The hind leg extends beyond the ends of the elytra and reaches the seventh sternite. The end of the fore-leg reaches the third sternite or the first apparent segment, whereas the mid-leg extends as far as the fourth.

Sternites 3 to 6 are alike, being short and broad. The seventh and eighth are longer and narrower. The ninth sternite is much broader than the ninth tergite.

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TABLES I-VIII

Explanation of Plate I

Fig. 1. — Adult (female), lateral aspect: 1-7 = hypopleurites; A.SC = antennal scrobe; C.C1, C.C2 = coxal cavity of the fore and mid legs respectively; C.T3 = cavity of the articulation of the trochanter of the hind leg; CX1, CX2, CX3 = coxa of fore, mid and hind leg respectively; E = eye; EP = epistoma; EPM = epimeron; EPS = episternum; MES.ST = mesosternum; MET.ST = metasternum; MET.T = metatergum; P = pygidium; PAR = parapterum; PL.S = pleural suture; P.P = propygidium; PR = pronotum; SCL = scutellum of mesonotergum; SP1-SP7 = seven abdominal spiracles; ST3-ST7 = third to seventh sternites; ST.T = ninth sternal and tergal tube; T = trochanter of hind leg; T1-T6 = first to sixth tergite; W.P = wing process. — × 7.5.

Fig. 2. — Head, dorsal aspect: A.SC = antennal scrobe; E = eye; EP = epistoma; E.S = epicranial suture; LB = labrum; LM.P = labial palp; MD = mandible; MX.P = maxillary palp. — × 12.

Fig. 3. — Head, ventral aspect: E = eye; G = genal area; LM.P = labial palp; MD = mandible; MX.P = maxillary palp; O.A = occipital apodeme; O.F = occipital foramen. — × 12.

Fig. 4. — Head, lateral aspect: A.SC = antennal scrobe; E = eye; EP = epistoma; E.S = epicranial suture; LB = labrum; M.A = membranous area; MD = mandible; MX.P = maxillary palp; P.G = pregenal area. — × 14.

Fig. 5. — Dorsal aspect of the anterior part of the head: C.S = clathrate sculpture; EP = epistoma; EP.PR = epistomal process; L.A = lateral articulation of the mandible; LB = labrum. — × 39.5.

Fig. 6. — Ventral aspect of the epistomal area: D.C = dorsal condyle for the articulation of the mandible; L.A = lateral arm; M.P = median part. — × 39.5.

Fig. 7. — Ventral anterior part of the head, drawn inside (diagramatic to show connection of mouth parts): C = cardo: C.A = semi-circular apodeme; G = galea; HY = hypostoma; L = lacinia; LM.P = labial palp; MX.C = maxillary condyle; MX.P = maxillary palp; V.F = ventral fossa. — × 48.

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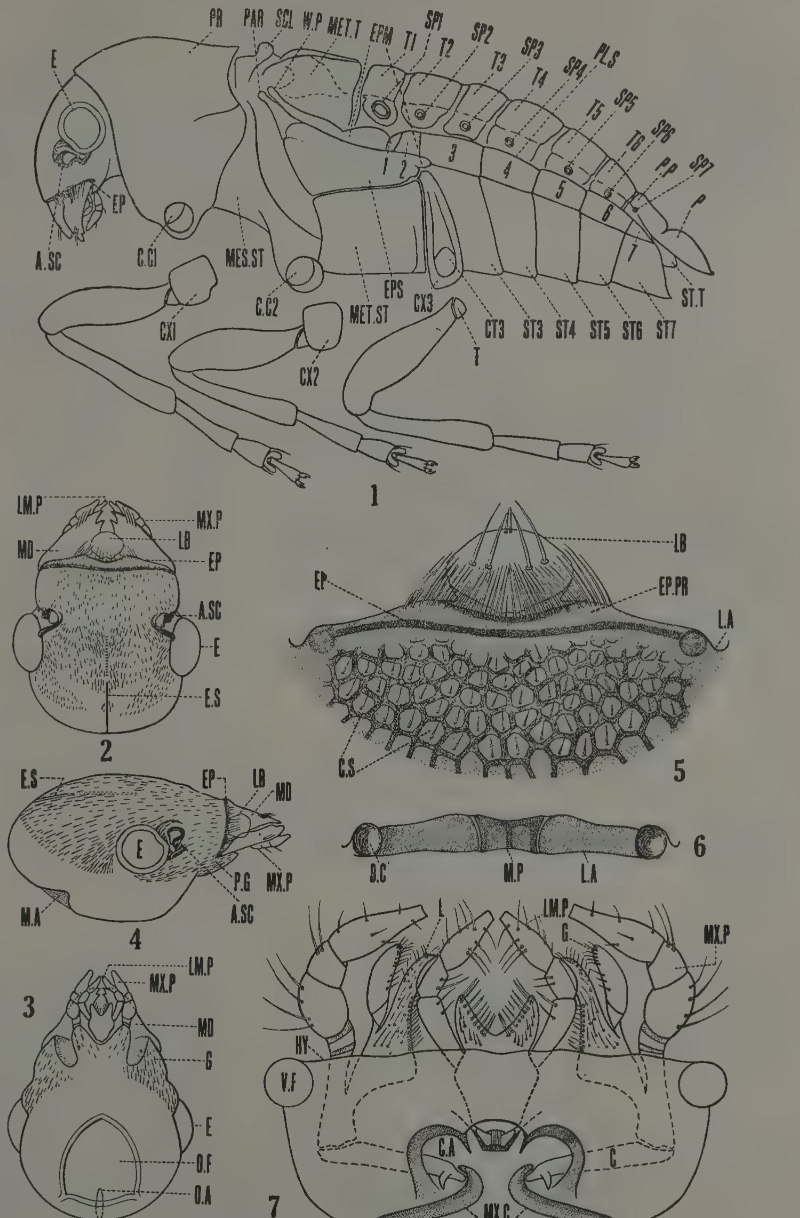
Plate I



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Explanation of Plate II

Fig. 8. — Mandible, dorsal: a, b, c, d = four groups of bristles; AB.M = abductor muscle; AD.M = adductor muscle; AP.T = apical tooth; D.F = dorsal fossa; L.C = lateral condyle; MD.PR = mandibular process; M.G = mandibular gland; MOL = molar; M.T = median tooth; S.AP.T = subapical tooth. — × 31.

Fig. 9. — Mandible, ventral: AP.T = apical tooth; L.C = lateral condyle; M.G = mandibular gland; MOL = molar; M.T = median tooth: S.AP.T = subapical tooth; V.C = ventral condyle. — × 31.

Fig. 10. — Portion of the mandibular gland (much enlarged).

Fig. 11. — Labrum, dorsal: C = clypeus; EP = epistoma; LB = labrum. — × 44.

Fig. 12. — Labrum, ventral: EPH = epipharynx. — × 44.

Fig. 13. — Labium, dorsal: LI = ligula; LM.P = labial palp; MS = muscles; P.M = prementum; S.M = submentum; V.W = ventral wall of the head. — × 57.5.

Fig. 14. — Abnormal labium: LPLI = labial palpi and ligula combined. — × 51.

Fig. 15. — Maxilla: C = cardo; C.PR = cardo process; GAL = galea; LAC = lacinia; MX.P = maxillary palp; S.G = subgalea; ST = stipes. — × 57.5.

Fig. 16. — Antenna: CL = club; PED = pedicel; SC = scape. — × 20.

Fig. 17. — Antenna: PED = pedicel; SC = scape. — × 51.

Fig. 18. — Antenna, club. — × 49.

Fig. 19. — Pronotum: B.M = basal margin; D.M = dorsal margin; P.D = posterior declivity. — × 10.5.

Fig. 20. — Prothorax, sternal aspect: A.F = anterior foramen; C1 = fore coxa; I.C = intercoxal area; P.F = posterior foramen. — × 10.5.

Fig. 21. — Prothorax, viewed posteriorly: C1 = fore coxa; C.T1 = cavity for the articulation of the trochanter; B.M = basal margin; D.M = dorsal margin; M = membrane; P.A = posterior angle; P.D = posterior declivity; P.F = posterior foramen; SP1 = first thoracic spiracle. — × 10.5.

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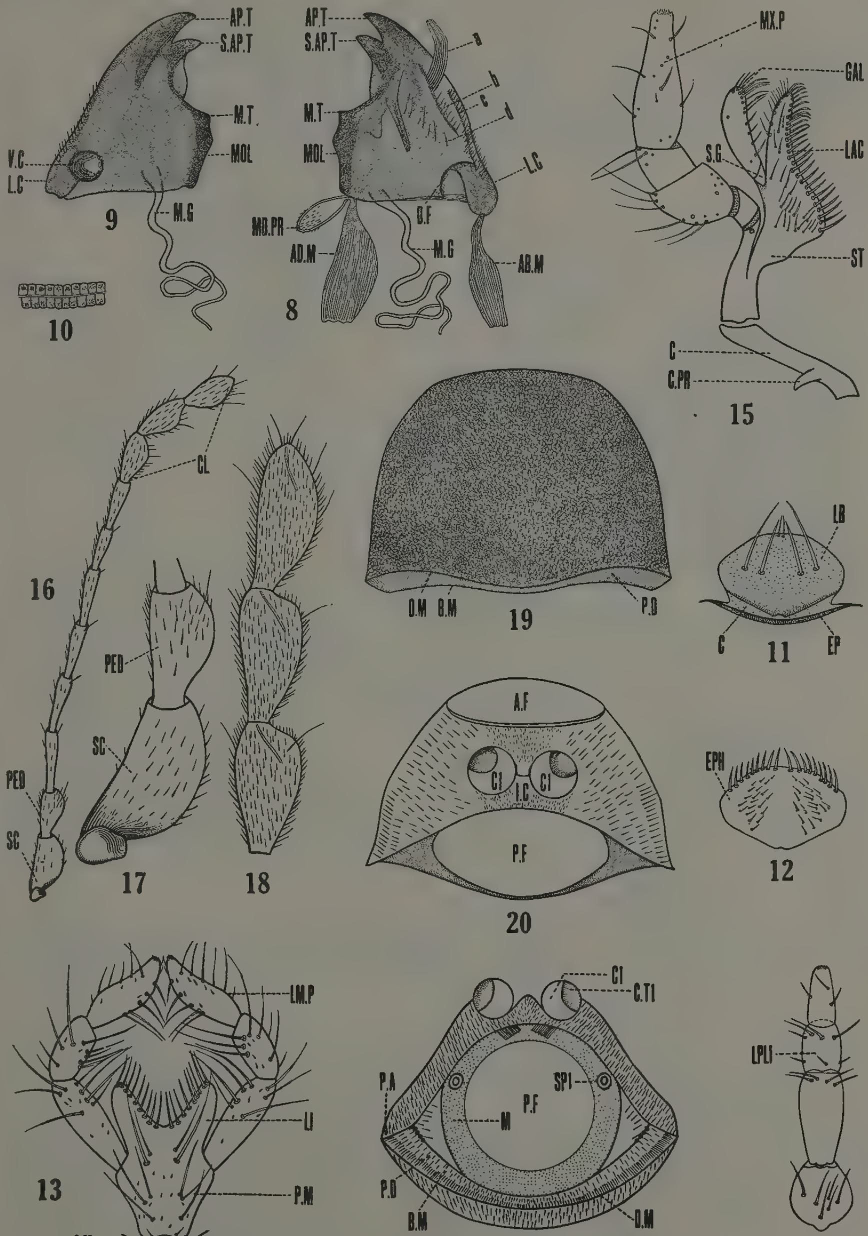
Plate II



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Explanation of Plate III

Fig. 22. — Mesotergum, dorsal; L.A = lateral arm of prescutum: L.PR = lateral or mesonotal process; P = prephragma; PS = prescutum; SC = scutum; SCL = scutellum. — × 22.5.

Fig. 23. — Mesotergum, ventral view: A.AP = anterior apodeme; L.AP = longitudinal apodeme. — × 22.5.

Fig. 24. — Meso- and metathoracic sternites: C3 = hind coxa; CC2 = coxal cavity of the mid leg; C.T3 = cavity for the articulation of the trochanter of the hind leg; EPM = meso-epimeron; EPS.A = meso-episternal area; I.C = intercoxal area; M.EPS = meta-episternum; P = apical projection of meta-epimeron; P.EPS = pre-episternum; P.EPS.P = pre-episternal process; PRES = presternum; S2 and S3 = meso- and metasterna; ST.A = sternellar area; ST.P = sternellar piece. — × 10.5.

Fig. 25. — Metatergum, dorsal: A.D = anterior disc; A.N.P = anterior notal process; A.SC = anterior scutal lobe; L.SC = lateral margin of scutum; M = membrane; M.A = membranous area of prescutum; M.D = muscle disc; M.G = median groove; M.PS.A = median prescutal area; P.N = postnotum; P.N.P = posterior notal process; P.SC = posterior scutal lobe; PS.L = prescutal lobe; SCL = scutellum. — × 13.

Fig. 26. — Anterior area of metatergum: A.N.P = anterior notal process; A.P = anterior phragma or prephragma; A.SC = anterior scutal lobe; L.A.P = lateral arm of prephragma; L.PS.F = lateral prescutal fold; M = membrane; M.D = muscle disc; PS.L = prescutal lobe. — × 13.

Fig. 27. — Postnotum and postphragma: A.A = anterior arm of postnotum; P.A = posterior arm of postnotum; P.N = postnotum; P.P = postphragma. — × 13.

Fig. 28. — Base of wing and its articulation to metatergum: A.A = anal area; A.N.P = anterior notal process; AX1, AX2, AX3 = first, second and third sclerite; C = costa; C + SC = costa and subcosta combined; CU2 = cubitus; H.AX1 = head of first axillary sclerite; H.C = head of costa; H.SC = head of subcosta; L = lateral margin of scutum; L.PS = lateral part of prescutum; M = membrane; ME = media; M.P = median plate; P.N = postnotum; P.N.P = posterior notal process; R = radius; r-m = vestigeal connection between

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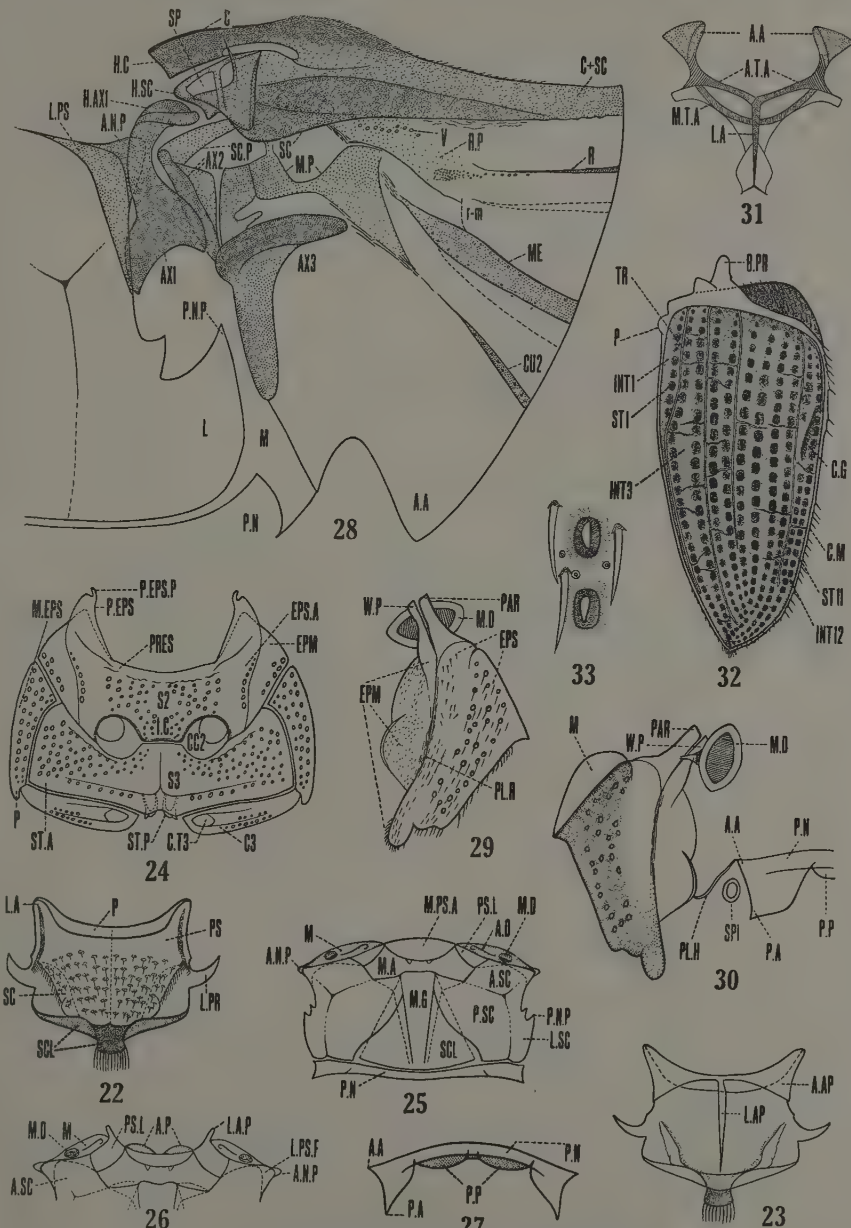
Plate III



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Explanation of Plate III (continuation)

radius and media ; R.P = radial plate ; SC = subcosta ; SC.P = subcostal plate ; SP = spur between costa and subcosta ; V = vesicles ? — (much enlarged).

Fig. 29. — Metapleurite, dorsal : EPM = epimeron ; EPS = episternum ; M.D = muscle disc ; PAR = parapterum ; PL.R = pleural ridge ; W.P = wing process. — (much enlarged).

Fig. 30. — Metapleurite, ventral : A.A = anterior arm of postnotum ; M = membrane ; M.D = muscle disc ; P.A = posterior arm of postnotum ; PAR = parapterum ; PL.H = pleural hook ; P.N = postnotum ; P.P = postphragma ; SP1 = first abdominal spiracle ; W.P = wing process. — × 17.

Fig. 31. — Endoskeleton : A.A = anterior arms ; A.T.A = anterior, transverse apodeme ; L.A = longitudinal apodeme ; M.T.A = median, transverse apodeme. = × 14.5.

Fig. 32. — Left-elytron, inside : B.PR = basal process ; C.G. = costal groove ; C.M = costal margin ; INT1, INT3 and INT12 = interspaces 1, 3 and 12 ; P = projection fitting into a groove of the elytron ; ST1 and ST11 = striae 1 and 11 ; TR = trachea. — × 10.

Fig. 33. — Vestiture of elytron. — × 62.5.

Explanation of Plate IV

Fig. 34. — Articulation of elytra: AX1, AX2 and AX3 = first, second and third axillary sclerites; A.P = anterior phragma or prephragma; B.PR = basal process; L = ligament; M.P = median plate; P.EPS = pre-episternum; P.EPS.P = pre-episternal process; R.P = radial pital; SCL = scutellum. — (much enlarged).

Fig. 35. — Hind wing: A.A = anal area; A.M = anal margin; AX1 and AX3 = first and third axillary sclerite; C = costa; C + SC = costa and subcosta combined; C.M = costal margin; CU1 and CU2 = cubitus; M = media; Mr = recurrent media; R = radius; Rr = recurrent radius; SC = subcosta. — × 7.5.

Fig. 36. — Wing folded, ventral aspect: C = costa; CU1 and CU2 = cubitus; L.a and L.b = longitudinal folds; R = radius; T.a and T.b = transverse folds. — (much enlarged).

Fig. 37. — Fore-leg: AP = apodeme; C1 = coxa; CL = claws; FE = femur; TB = tibia; T.G = transverse groove; TR = trochanter; ts1-ts5 = five joints of tarsi. — × 14.

Fig. 38. — Last four joints of tarsi: CL = claws; ts1-ts5 = five joints of tarsi. — × 22.5.

Fig. 39. — Mid coxa: AP = apodeme; C.A.T2 = cavity for the articulation of the trochanter. — × 14.

Fig. 40. — Hind coxa, dorsal. — × 11.

Fig. 41. — Hind coxa, ventral: C.A.T3 = cavity for the articulation of the trochanter; C3 = coxa; M.D = muscle disc; M.EPM = posterior end of meta-epimeron. — × 11.

Fig. 42. — Femur, inside: H = hollow. — × 12.5.

Fig. 43. — Abdominal tergites of the female: L = ligament; P = pygidium; PL6 = sixth pleurite; P.P = pro-pygidium; SP1 and SP7 = first and seventh abdominal spiracles. — (much enlarged).

Fig. 44. — The last two external abdominal tergites of the female: P = pygidium or eighth tergite; P.P = pro-pygidium or seventh tergite. — × 12.5.

Fig. 45. — The last two external sternites of the female: P = pygidium or eight tergite; ST6 and ST7 = sixth and seventh sternites. — × 12.

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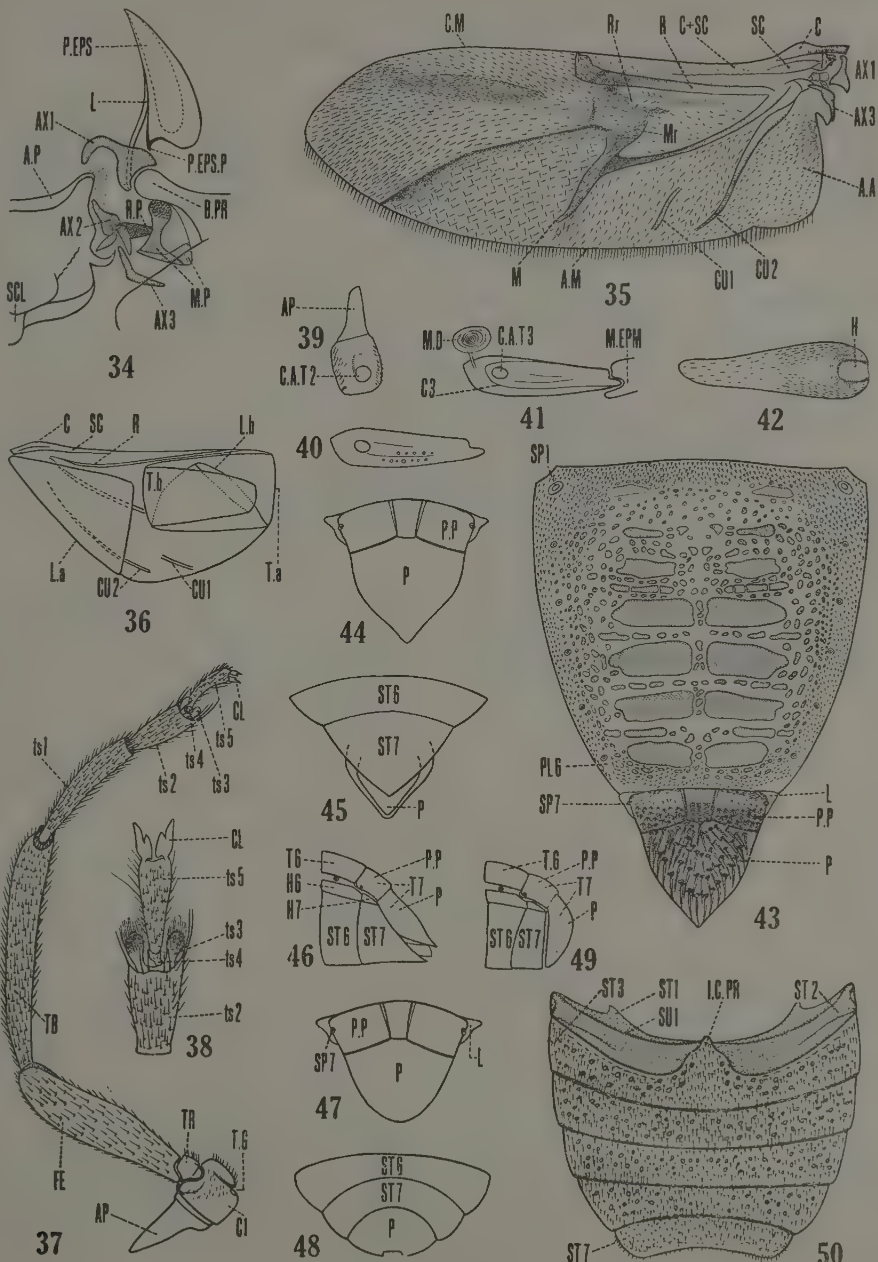
Plate IV



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Explanation of Plate IV (continuation)

Fig. 46. — End of the female abdomen, lateral: H6 and H7 = sixth and seventh hypopleurites; P = pygidium or eight tergite; P.P = pro-pygidium or seventh tergite; ST6 and ST7 = sixth and seventh sternites; T6 and T7 = sixth and seventh tergites. — × 10.

Fig. 47. — The last two external abdominal tergites of the male: L = ligament; P = pygidium or eight tergite; P.P = pro-pygidium or seventh tergite; SP7 = seventh abdominal spiracle. — × 12.5.

Fig. 48. — The last two external sternites of the male: P = pygidium or eight tergite; ST6 and ST7 = sixth and seventh sternites. — × 12.

Fig. 49. — End of the male abdomen, male: P = pygidium or eight tergite; P.P = pro-pygidium or seventh tergite; ST6 and ST7 = sixth and seventh sternites; T6 and T7 = sixth and seventh tergites. — × 10.

Fig. 50. — Abdominal sternites of the male: I.C.PR = intercoxal process; ST1, ST2, ST3 and ST7 = first, second, third and seventh sternites; SU1 = first suture between first and second sternite. — (much enlarged).

Explanation of Plate V

Fig. 51. — Internal segments of the male, ventral: SP = spicule; ST8 = eighth sternite; T9 = ninth tergite. — × 17.

Fig. 52. — Internal segments of the male, lateral, with rectum; A = anus; L.C = lateral chitinisation in ninth tergite; R = rectum; R.C = chitinisation on the rectum; SP = spicule; T9 = ninth tergite. — × 17.

Fig. 53. — Internal segments of the female, dorsal, with rectum: A.T = anal tube; OV = ovipositor; R = rectum; ST.T = ninth sternal and tergal tube. — × 26.

Fig. 54. — Internal segments of the female, lateral, with rectum: A = anus; A.T = anal tube; R = rectum; ST.T = ninth sternal and tergal tube. — × 26.

Fig. 55. — Female genitalia, dorsal: COX = coxite; M = membrane; SP = spines; ST = stylus. — × 22.5.

Fig. 56. — Female genitalia, lateral: COX = coxite; M = membrane; SP = spines; ST = stylus; V.T = vaginal tube. — × 22.5.

Fig. 57. — Male genitalia, lateral: C.S = chitinised spur; D.L = dorsal lobe of median plate; E.D = ejaculatory duct; FL = flagellum; M.P = median plate; M.S = median struts; P = papillae; SP = spicule; T = tegmen; T.D = transverse denticle; V.L = ventral lobe of median plate. — × 22.5.

Fig. 58. — Male genitalia, ventral (spicule omitted): D.L = dorsal lobe or median plate, G = groove on distal end of the tegmen; M.S = median plate; T = tegmen; V.L = ventral lobe of median plate. — × 22.5.

Fig. 59. — Distal end of tegmen, dorsal. — × 66.

Fig. 60. — Distal end of tegmen, ventral. — × 66.

Fig. 61. — Alimentary canal of the adult: C = crop; G = gizzard; H.I = hind intestine; M.I = mid intestine; M.T = malpighian tubes; OE = oesophagus; P.E.M.T = posterior end of malpighian tubes; R = rectum; U.C = U-shaped chitinisation. — (much enlarged).

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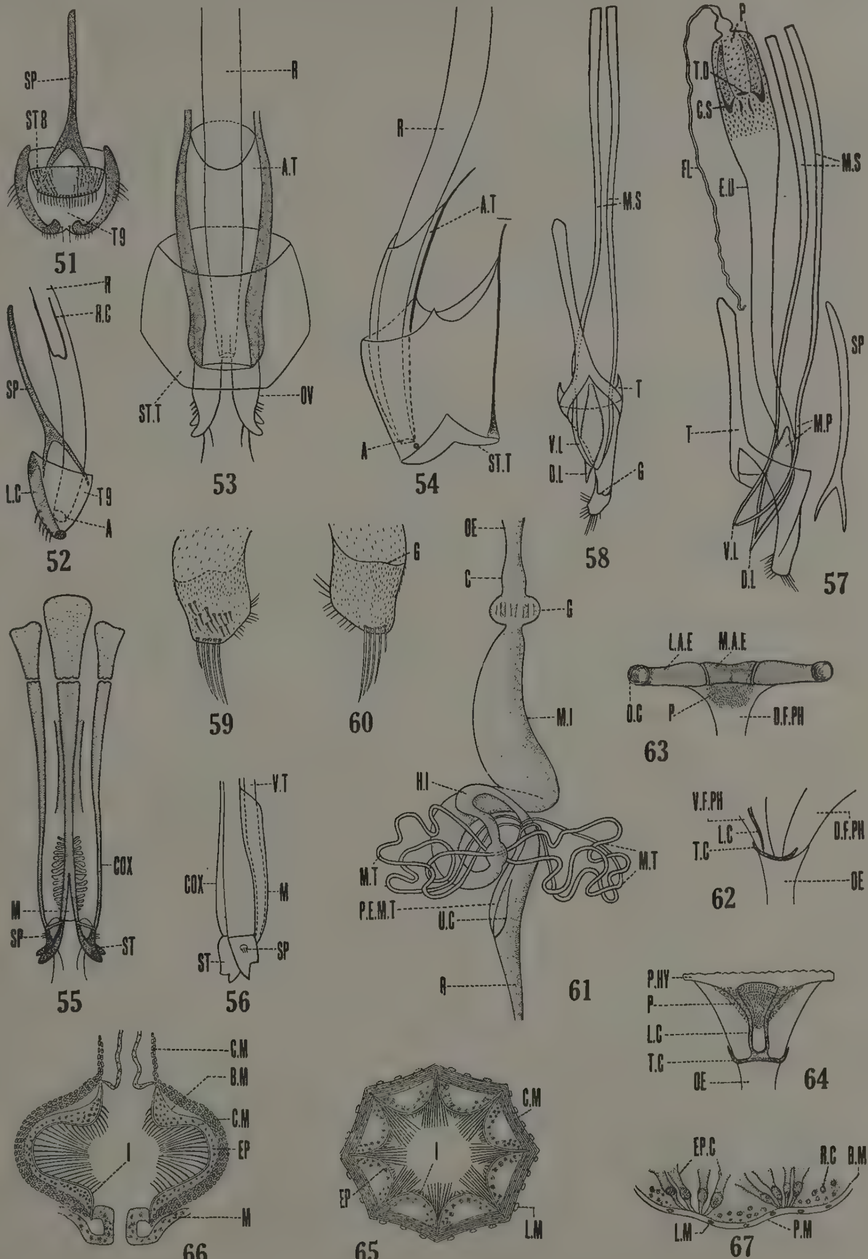
Plate V



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Expanation of Plate V (continuation)

Fig. 62. — Pharyngeal folds, lateral : D.F.PH = dorsal fold of pharynx ; L.C = longitudinal chitinisation in ventral fold ; OE = oesophagus ; T.C = transverse chitinisation between pharynx and oesophagus ; V.F.PH = ventral fold of pharynx. — (much enlarged).

Fig. 63. — Pharyngeal region, dorsal : D.C = dorsal condyle at lateral end of epistoma ; D.F.PH = dorsa fold of pharynx ; L.A.E = lateral arm of epistoma ; P = papillae. — × 20.

Fig. 64. — Pharyngeal region, ventral : L.C = longitudinal chitinisation in ventral fold ; OE = œsophagus ; P = papillae ; P.HY = posterior end of hypostoma ; T.C = transverse chitinisation between pharynx and œsophagus. — (much enlarged).

Fig. 65. — Transverse section in gizzard : B.M = basement membrane ; C.M = circular muscles ; EP = epithelium ; I = intima or chitinised layer lining the gizzard ; M = mesentron of mid intestine. — (much enlarged).

Fig. 66. — Longitudinal section in gizzard : C.M = circular muscles ; EP = epithelium ; I = intima or chitinised layer lining the gizzard ; L.M = longitudinal muscles. — (much enlarged).

Fig. 67. — Transverse section in mid-intestine : B.M = basement membrane ; EP.C = epithelial cells ; L.M = longitudnial muscles ; P.M = peritonial membrane ; R.C = regenerative cells of epithelium. — (much enlarged).

Explanation of Plate VI

Fig. 68. — Transverse section in hind intestine, ilium region: C.M = circular muscles; EP = epithelium; I = intima; L.M = longitudinal muscles; M.T = malpighian tubes; P = peritone. — (much enlarged).

Fig. 69. — Transverse section in hind intestine, colon region; C = chitinised streak on both sides; C.M = circular muscles; EP = epithelium; I = intima; M.T = malpighian tubes; P = peritone. — (much enlarged).

Fig. 70. — Transverse section in the rectum: C.M = circular muscles; EP = epithelium; I = intima. — (much enlarged).

Fig. 71. — Nervous system of the adult: A.N = antennal nerves; E = eye; LB.N = labral nerve; O.L = optic lobes; PR.L = protocerebral lobe. — (much enlarged).

Fig. 72. — Lateral view of the nervous system in the head and prothorax: G = gizzard; LM.N = labial nerve; MD.N = mandibular nerve; MX.N = maxillary nerve; OE = œsophagus; O.L = optic lobe; PR.L = protocerebral lobe; SO.G = sub-œsophageal ganglion; TH1.G = first thoracic ganglion. — (much enlarged).

Fig. 73. — Mature reproductive organs of the female: B.C = bursa copulatrix; C = internal and lateral chitinisation in bursa copulatrix; FIL = filaments; GER = germarium; M = muscles; P.OV = paired oviduct; SP = spermatheca; SP.D = spermathecal ducts; UT = uterus; VAG = vagina; VIT = vitellarium. — (much enlarged).

Fig. 74. — Immature reproductive organs of the female: B.C = bursa copulatrix; FIL = filaments; GER = germarium; SP = spermatheca; SP.G = spermathecal gland; UT = uterus; VAG = vagina. — (much enlarged).

Fig. 75. — Striated and rough surface of uterus. — (much enlarged).

Fig. 76. — Male reproductive organs and genitalia (spicule not drawn): A.G = accessory gland; E.D = ejaculatory duct; L = lobes of the median plate; M = muscles; S.T = seminal tube; T = tegmen; TS = testes; V.D = vas deferens; V.S = vesicula seminalis. — (much enlarged).

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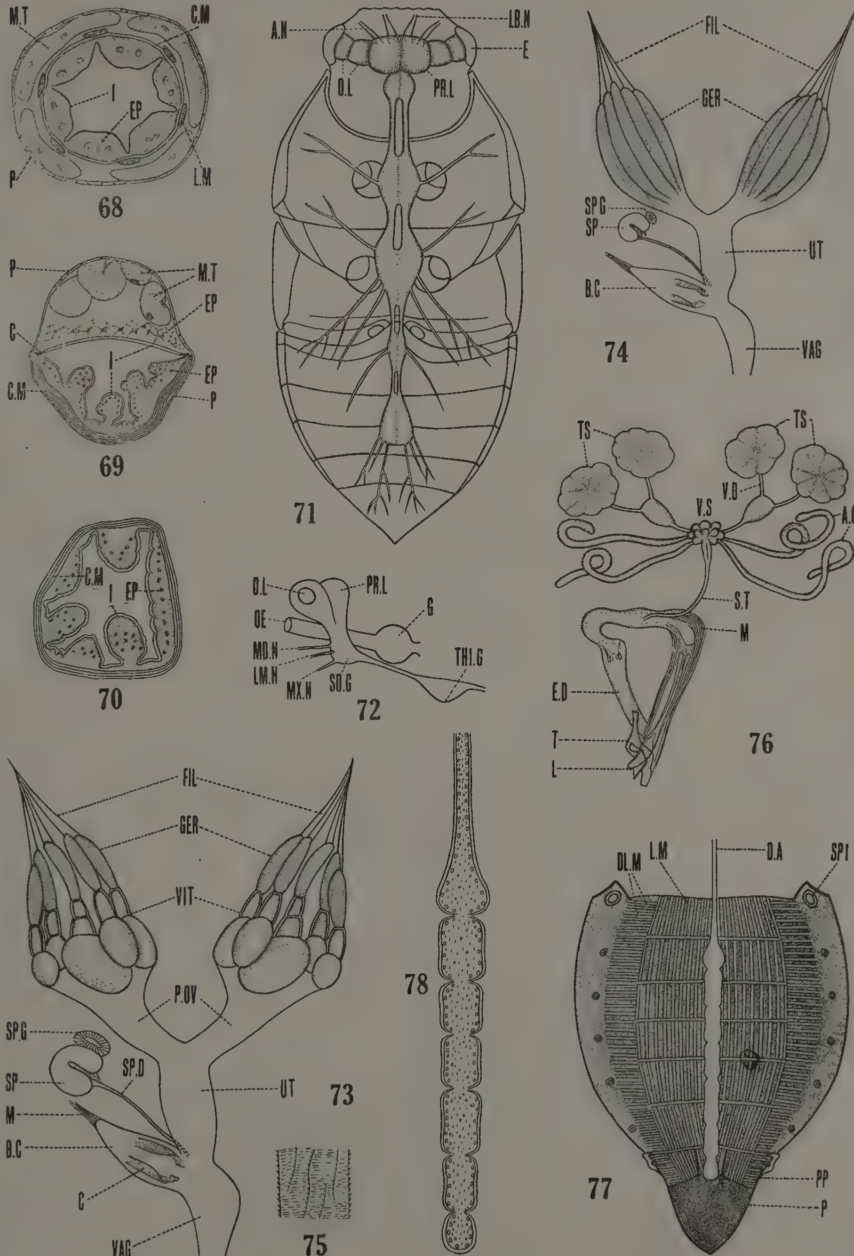
Plate VI



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Explanation of Plate VI (continuation)

Fig. 77. — Abdominal tergites, internal, showing heart and tergal muscles: D.A = dorsal aorta; DL.M = dorso-lateral muscles; L.M = longitudinal muscles; P = pygidium; P.P = propygidium; SP1 = first abdominal spiracle. — (much enlarged).

Fig. 78. — Heart of the adult. — (much enlarged).

Explanation of Plate VII

Fig. 79. — Transverse section in adult heart: A.M = alary muscles; B.C = blood corpuscles; F.B = fat bodies; N = nucleus; P.N = pericardial nephrocyte; P.W = pericardial wall; W.H = wall of heart. — (much enlarged).

Fig. 80. — Respiratory system: D.T = dorsal trachea; E.T = trachea that gives rise to tracheation of elytra; H = head; H.W.T. = trachea that gives rise to tracheation of the hind wing; M.TH = metathorax; MT.TH = metathorax; P.TH = prothorax; V.T = ventral trachea. — (much enlarged).

Fig. 81. — The egg. — × 15.

Fig. 82. — The mature larva. — × 4.

Fig. 83. — Head of larva, dorsal. — × 20.

Fig. 84. — Head of larva, front view: ANT = antenna; C = clypeus; D.A = dorsal articulation of the mandible; EP = epistoma; H.B = hypopharyngeal bracon; LM = labium; MX = maxilla; OC = ocellus. — (much enlarged).

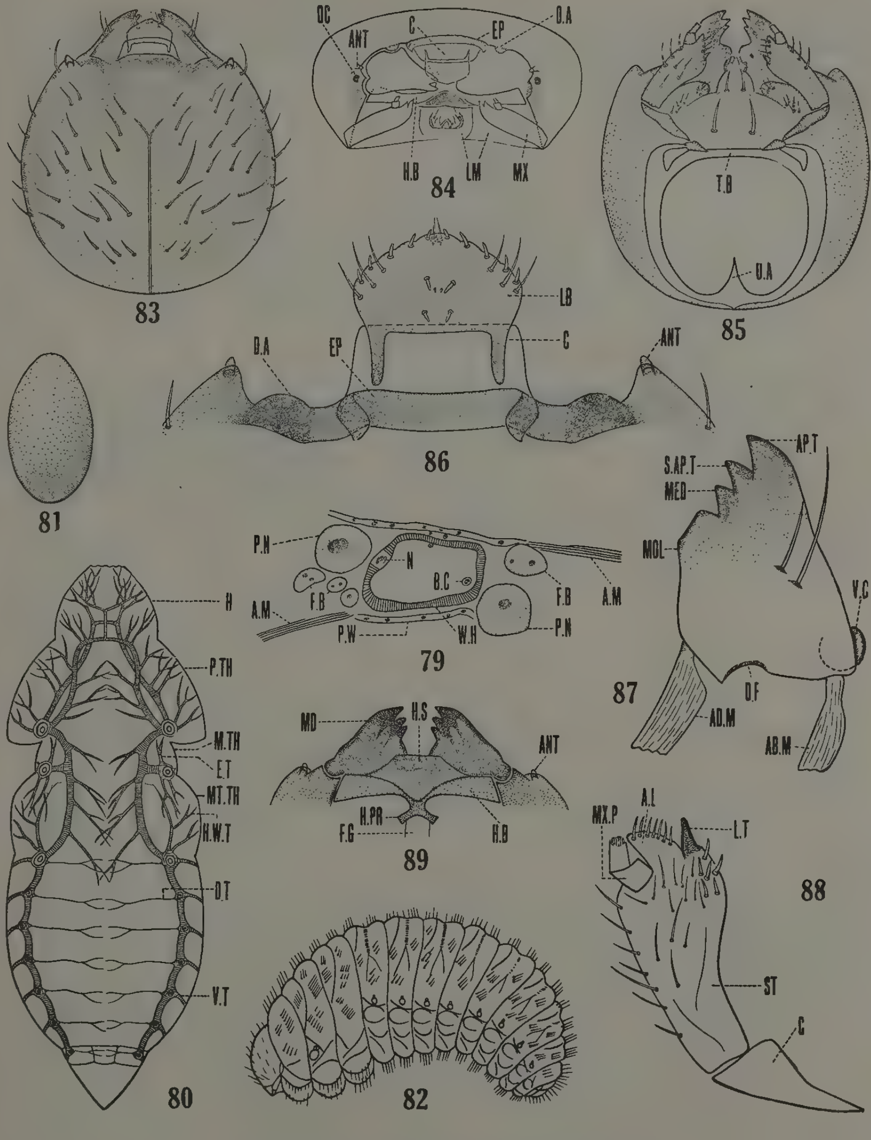
Fig. 85. — Head of larva, ventral: O.A = occipital apodeme; T.B = tentorial bridge. — × 22.

Fig. 86. — Dorsal part of the head of the larva, from the inside: ANT = antenna; C = clypeus; D.A = dorsal articulation; EP = epistoma; LB = labrum. — × 50.

Fig. 87. — Mandible of the larva: AB.N = abductor muscle; AD.M = adductor muscle; AP.T = apical tooth; D.F = dorsal fossa; MED = median tooth; MOL = molar; S.AP.T = subapical tooth; V.C = ventral condyle. — × 54.

Fig. 88. — Maxilla of the larva: A.L = anterior lobe; C = cardo; L.T = lacinal tooth; MX.P = maxillary palp; ST = stipes. — × 51.

Fig. 89. — Anterior part of the head, ventral, after removing labium and maxillae: ANT = antenna; F.G = fore-gut; H.B = hypopharyngeal bracon; H.PR = hypopharyngeal process; H.S = hypopharyngeal sclerome; MD = mandible. — (much enlarged).



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Explanation of Plate VIII

Fig. 90. — Mentum and prementum, frontal view: H.S = hypopharyngeal sclerome; M = mentum; P.M = prementum. — (much enlarged).

Fig. 91. — Labium of the larva, ventral: LM.MX.A = labial and maxillary articulation; M = mentum; P.M = prementum; S.M = submentum. — × 48.

Fig. 92. — Tergal and pleural lobes of the pro- and mesothorax: A.D = anterior division of mesotergum; AL.A = alar area; EP.L = epipleural lobe; P.D = posterior division of mesotergum; P.L = pedal lobes; PL.L = pleural lobe of prothorax; PR = pronotum; TH.SP = thoracic spiracle. — (much enlarged).

Fig. 93. — Tergal, pleural and sternal lobes of the abdomen: AB.SP = abdominal spiracle; A.D = anterior division of mesotergum; AL.A = alar area; C.L = coxal lobe; EP.L = epipleural lobe; EU = eusternum: HY.L = hypopleural lobe; P.D = posterior division of mesotergum; TU = tubercles. — (much enlarged).

Fig. 94. — Alimentary canal of the larva: C = crop; G = gizzard; M.I = mid-intestine; M.T = malpighian tubes; OE = œsophagus; R = rectum; S.G = salivary gland. — (much enlarged).

Fig. 95. — Nervous and respiratory systems of the larva (much enlarged).

Fig. 96. — Thoracic spiracle of the larva, biforous and large. — × 107.

Fig. 97. — Abdominal spiracle of the larva, uniforous and small. — × 107.

Fig. 98. — Pupa, dorsal: PR = lateral process of ninth segment; T7, T8, T9 and T10 = seventh, eighth, ninth and tenth tergites. — (much enlarged).

Fig. 99. — Pupa, ventral: PR = lateral process of ninth segment; ST7, ST8, ST9 and ST10 = seventh, eighth, ninth and tenth sternites. — (much enlarged).

Fig. 100. — Last four abdominal segments of the pupa, dorsal: PR = lateral processes of ninth segment; T7, T8, T9 and T10 = seventh, eighth, ninth and tenth tergites. — × 17.

Fig. 101. — Last four abdominal segments of the pupa, ventral; PR = lateral process of ninth segment; ST7, ST8, ST9 and ST10 = seventh, eighth, ninth, and tenth sternites. — × 13.

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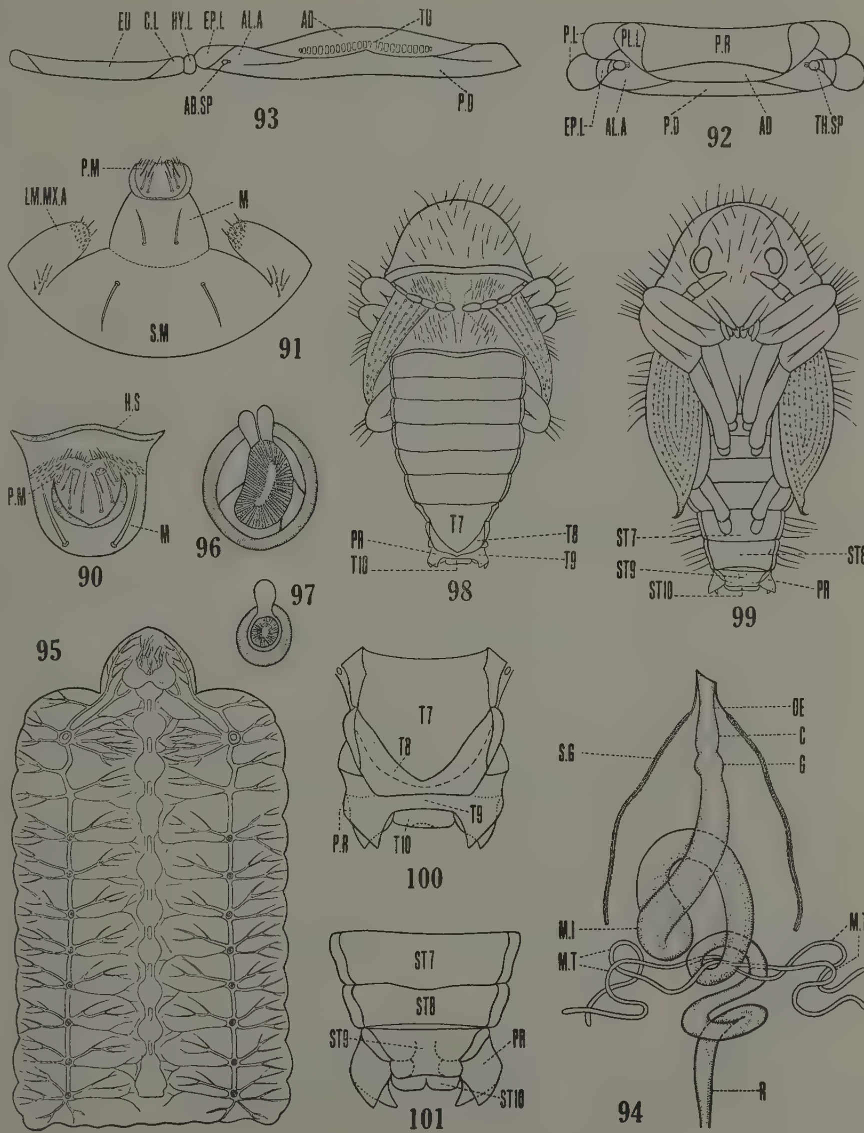
Plate VIII



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Les *Tachysphex* de la faune égyptienne

[Hymenoptera : Sphecidae]

(avec 1 Figure)

par JACQUES DE BEAUMONT

L'étude des *Tachysphex* de la faune égyptienne a pu être entreprise grâce à l'obligeance de mes collègues d'Egypte. Monsieur le Professeur Docteur H. Priesner, Directeur de la Section d'Entomologie du Ministère de l'Agriculture, a bien voulu m'adresser la collection de ce Département, au complet; Monsieur A. Alfieri, Secrétaire Général et Conservateur de la Société Fouad I^er d'Entomologie, m'a fait parvenir les exemplaires appartenant au Musée de la Société et ceux de sa propre collection; Monsieur le Professeur Docteur A. Mochi a mis à ma disposition les individus provenant de ses récoltes. C'est un vif plaisir pour moi de remercier ici ces distingués collègues.

Dans la présente étude, les caractères utilisés pour la détermination sont ceux adoptés dans mon travail relatif aux *Tachysphex* de France (1). Quelques indications complémentaires, concernant certains caractères, sont données ci-dessous :

Peigne rudimentaire au tarse du ♂ : Entre les ♂♂ ayant un peigne rudimentaire et ceux qui n'en ont pas, il y a quelques intermédiaires. On peut parler d'un peigne lorsqu'il existe à l'extrémité des deux premiers articles deux épines voisines, celles du deuxième article dépassant en général l'apex du troisième, et, naturellement, quelques épines le long du métatarse (premier article).

Pièces buccales : Il y a deux types principaux : dans les groupes de *panzeri* v. d. Lind. et de *luxuriosus* Morice, le labre est très développé et la galea des maxilles est longue; dans les autres groupes, le labre est moins développé et la galea courte.

La Table de détermination qui suit ne comprend que les espèces sûres. Outre ces espèces, il reste quelques individus que je ne sais comment classer. Des renseignements complémentaires permettront de leur assigner une place, soit comme espèces distinctes, soit comme simples variétés.

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(1) Jacques de Beaumont : Les *Tachysphex* de la faune française (*Annales de la Société Entomologique de France*, Vol. CV, 3e trim., 1936, pp. 178-184).

TABLE DE DETERMINATION

Distinction des sexes

♀ : 12 articles aux antennes; 6 segments visibles à l'abdomen, le 6e présentant une aire pygidiale nettement limitée; fémurs antérieurs non échancrés à la base; tarses antérieurs portant un peigne formé d'épines fines et longues.

♂ : 13 articles aux antennes; 7 segments visibles à l'abdomen, le 7e ne présentant pas d'aire pygidiale nettement limitée; fémurs antérieurs échancrés à la base; tarses antérieurs portant tout au plus un peigne rudimentaire.

♀♀

1. Mandibules sans échancrure sur leur arête inférieure; pas de peigne au tarse antérieur; abdomen noir, brillant, avec une ponctuation nette et espacée .... *T. holognathus* Morice

— Une échancrure aux mandibules; un peigne au tarse antérieur; pas de ponctuation nette à l'abdomen 2

2. Labre bombé, dépassant nettement le bord antérieur du clypéus; galea des maxilles à peu près aussi longue que le scape sans son bouton articulaire (ce dernier caractère n'est visible que lorsque les pièces buccales sont dépliées) 3

— Labre aplati, entièrement ou presqu'entièrement caché sous le clypéus; galea des maxilles beaucoup plus courte 13

3. La distance interoculaire égale au moins la longueur des articles 2+3 du funicule; face dorsale du segment médiaire plus ou moins nettement striée 4

— La distance interoculaire égale au plus la longueur des 2 premiers articles du funicule; face dorsale du segment médiaire non striée 5

4. Abdomen entièrement rouge .... *T. luxuriosus* Morice

— Abdomen noir dans sa partie postérieure .... *T. horus* nov. spec.

5. Abdomen entièrement noir; ailes fortement enfumées ....
.... *T. chephren* nov. spec.

— Abdomen rouge, au moins à la base 6

6. Mandibules avec une échancrure très développée; leur partie basale, avant l'échancrure, plus haute que longue et se terminant par un angle

proéminent ; des bandes de pruinosité sur les 5 premiers tergites ......
.... *T. buyssoni* Morice

— Mandibules avec une échancrure moins développée ; leur partie basale plus longue que haute 7

7. Le plus long éperon des tibias postérieurs avec des dents assez fortes ; tout le thorax et le segment médiaire recouverts d'une forte pilosité laineuse ; des bandes de pruinosité sur les 5 premiers tergites ....
.... *T. micans* Rad.

— Le plus long éperon des tibias postérieurs avec des dents beaucoup plus fines ; pilosité de la tête et du thorax beaucoup moins développée ; pas de pruinosité sur le 5^e tergite 8

8. Bord antérieur du clypéus sans échancrure au milieu 9

— Bord antérieur du clypéus avec une petite échancrure au milieu 10

9. Articles des palpes longs ; aire pygidiale à peu près plane, étroite et pas très brillante ; pas de pruinosité argentée à l'abdomen ....
.... *T. longipalpis* nov. spec.

— Articles des palpes courts ; aire pygidiale bombée, assez large et très brillante .... *T. mycerinus* nov. spec.

10. Ailes antérieures nettement enfumées ; pas de bandes de pruinosité à l'abdomen .... *T. gracilicornis* Mercet

— Ailes antérieures pas ou peu enfumées ; des bandes de pruinosité à l'abdomen 11

11. Aire pygidiale brillante, assez large ; bord antérieur du clypéus avec un petit redent de chaque côté, près de ses angles latéraux (individus frais !) ; le 4^e tergite presque toujours dépourvu de pruinosité argentée
.... *T. pygidialis* Kohl

— Aire pygidiale moins brillante, finement chagrinée, plus étroite ; bord antérieur du clypéus sans redents près de ses angles latéraux ; le 4^e tergite presque toujours avec une bande de pruinosité 12

12. Face dorsale du segment médiaire recouverte d'une pilosité dense, cachant la sculpture chez les individus frais ; la distance interoculaire est plus courte que la longueur du 2^e article du funicule .. *T. cheops* nov. spec.

— Pilosité du segment médiaire moins dense, ne cachant pas la sculpture ; distance interoculaire presque toujours au moins égale à la longueur du 2^e article du funicule .... *T. panzeri* v. d. Lind.

13. Abdomen entièrement noir 14

— Abdomen en partie rouge ou entièrement rouge 29

14. Le plus grand éperon des tibias postérieurs avec des dents espacées et très fortes ; mésonotum avec une sculpture aréolée ; une bande enfumée au travers des ailes antérieures .... *T. schmiedeknechti* Kohl

— Le plus grand éperon des tibias 3 avec des dents fines et serrées ; mésonotum plus ou moins distinctement ponctué ; pas de bande enfumée au travers des ailes antérieures 15

15. Segment médiaire et base du premier tergite avec une forte pilosité d'aspect laineux ; aire pygidiale finement réticulée, entièrement mate .... *T. albocinctus* Lucas

— La pilosité du segment médiaire n'est jamais laineuse ; aire pygidiale presque toujours plus ou moins brillante 16

16. Aire pygidiale large et arrondie à l'extrémité 17

— Aire pygidiale plus étroite et triangulaire 18

17. Côtés du segment médiaire en général finement striés ; clypéus moins aplati .... *T. julliani* Kohl

— Côtés du segment médiaire non striés ; clypéus plus aplati .... *T. abjectus* Kohl

18. Tibias en partie rouges 19

— Tibias entièrement noirs 21

19. Premier sternite non caréné longitudinalement ; bord postérieur des tergites décoloré ; vertex large ; bord antérieur du clypéus anguleux .... *T. fasciatus* Morice

— Premier sternite caréné ; bord postérieur des tergites non décoloré ; vertex étroit ; bord antérieur du clypéus non anguleux 20

20. Fémurs 1 et 2 avec une pilosité dressée ; aire pygidiale nettement bordée .... *T. maidli* nov. spec.

— Fémurs 1 et 2 sans pilosité dressée ; aire pygidiale plus étroite et moins nettement bordée .... *T. mantivora* nov. spec.

21. Pas de suture épisternale aux mésopleures ; cellule radiale très fortement tronquée. Aire pygidiale très mate .... *T. imperfectus* nov. spec.

— Une suture épisternale aux mésopleures ; cellule radiale moins fortement tronquée ; aire pygidiale plus ou moins brillante 22

22. Côtés du segment médiaire très brillants, avec une ponctuation très fine et espacée ; face dorsale du segment médiaire très fortement striée ; face à sculpture très fine d'aspect soyeux .... *T. plicosus* Costa

— Côtés du segment médiaire plus ou moins nettement striés, sa face supérieure moins nettement striée ; face ponctuée ou chagrinée 23

23. Base du premier tergite avec une pilosité dressée ; vertex, vu de face, concave ; mésopleures mates, sans ponctuation nette .... *T. priesneri* nov. spec.

— Base du premier tergite sans pilosité ; vertex non concave ; mésopleures brillantes ou nettement ponctuées 24

24. Mésopleures très brillantes, lisses ou à peine ponctuées ; taille faible ; face inférieure du scape et extrémité de l'aire pygidiale tachées de ferrugineux .... *T. cabrerai* Mercet

— Mésopleures nettement ponctuées, au moins en avant ; taille plus grande ; scape et aire pygidiale en général noirs 25

25. Antennes très longues ; les articles médians du funicule 4 ou 5 fois plus longs que larges .... *T. filicornis* Kohl

— Antennes moins longues ; les articles médians du funicule au plus 3 fois plus longs que larges 26

26. Ponctuation des mésopleures peu nette dans leur partie postérieure ; la distance interoculaire égale la longueur des articles 2+3 du funicule ; clypéus très aplati, sans aire apicale brillante nette .... *T. helveticus* Kohl

— Ponctuation des mésopleures nette sur toute leur surface ; distance interoculaire plus courte que la longueur des articles 2+3 du funicule ; clypéus moins plat avec une aire apicale brillante nette 27

27. Aire apicale brillante du clypéus plus longue ou aussi longue au milieu que l'aire basale ponctuée .... *T. nitidus* Spin.

— Aire apicale du clypéus plus courte que l'aire basale ponctuée 28

28. Deuxième sternite à ponctuation très étendue, ponctuation plus forte et plus espacée sur la face et sur le thorax ...... *T. nitidior* nov. spec.

— Partie postérieure du 2e sternite largement imponctuée ; ponctuation de la face et du thorax plus serrée .... *T. tarsinus* Lep.

29. Aire pygidiale large à l'extrémité, ou divisée transversalement en 2 zones différement sculptées 30

— Aire pygidiale pointue à l'extrémité et sans division transversale 31

30. Face et thorax recouverts d'une pilosité dense, cachant la sculpture chez les individus frais ; abdomen avec des bandes de pruinosité denses sur les 4 premiers tergites .... *T. vestitus* Kohl

— Pilosité de la face et du thorax beaucoup moins dense ; des bandes de pruinosité, moins développées, sur les 3 premiers tergites seulement .... *T. julliani* Kohl

31. Tibias noirs .... *T. pectinipes* L.

— Tibias plus ou moins tachés de rouge 32

32. Tête entièrement recouverte d'une pilosité appliquée, à vifs reliefs argentés, cachant complètement les téguments ; une pilosité semblable sur le thorax 33

— Pilosité de la tête et du thorax moins développée et moins argentée .. 34

33. Une carêne longitudinale au premier sternite ; face moins bombée .... *T. osiris* nov. spec.

— Pas de carêne longitudinale au premier sternite ; face avec un tubercule très saillant .... *T. isis* nov. spec.

34. Taille grande ; aire pygidiale très fortement rétrécie en arrière ; premier sternite caréné longitudinalement .... *T. grandissimus* Gussak.

— Taille plus faible ; aire pygidiale triangulaire ; pas de carêne au premier sternite 35

35. Face avec une très forte protubérance ; funicule en partie rouge .... *T. deserticola* nov. spec.

— Face aplatie ; funicule noir .... *T. speciosissimus* Morice

♂♂

1. Mandibules sans échancrure sur leur arête inférieure ; abdomen noir, brillant, avec une ponctuation nette et espacée .... *T. holognathus* Morice

— Pas d'échancrure aux mandibules ; pas de ponctuation nette à l'abdomen 2

2. Labre bombé, dépassant nettement le bord antérieur du clypéus ; galea des maxilles à peu près aussi longue que le scape sans son bouton articulaire 3

— Labre aplati, entièrement ou presqu'entièrement caché par le clypéus ;

galea des maxilles beaucoup plus courte 15

3. Fémurs antérieurs sans échancrure à la base 4

— Fémurs avec l'échancrure habituelle à la base 5

4. Tarse antérieur portant un peigne rudimentaire ; les épines situées à l'extrémité du 2e article dépassent l'apex du 3e ; abdomen noir à l'extrémité .... *T. horus* nov. spec.

— Pas de peigne rudimentaire ; abdomen souvent entièrement rouge .... *T. luxuriosus* Morice

5. Peigne du tarse antérieur bien développé ; les épines situées à l'extrémité du 2e article dépassent l'apex du 3e 6

— Peigne du tarse antérieur absent ou moins développé ; les épines de l'extrémité du 2e article atteignent tout au plus l'apex du 3e 11

6. Echancrure des mandibules très grande (comme chez la ♀) .... *T. buyssoni* Morice

— Echancrure des mandibules plus petite (comme chez la ♀) 7

7. Eperons des tibias postérieurs et pilosité comme chez la ♀ .... *T. micans* Rad.

— Eperons des tibias postérieurs et pilosité comme chez la ♀ ; espèces que l'on ne distingue sûrement que par l'étude de l'armature génitale 8

8. Pilosité de la face franchement argentée jusqu'en dessus des insertions antennaires, dorée plus haut ; extrémité de l'abdomen noire ; pas d'échancrure au milieu du bord antérieur du clypéus .... *T. mycerinus* nov. spec.

— Pilosité de la face presque toujours entièrement dorée ou argentée ; abdomen souvent entièrement rouge ; souvent une petite échancrure au milieu du bord antérieur du clypéus 9

9. Pilosité du thorax plus développée, cachant complètement la sculpture sur la face dorsale du segment médiaire chez les individus frais ; pilosité de la face toujours argentée ; distance interoculaire plus courte que la longueur des 2 premiers articles du funicule réunis .... *T. cheops* nov. spec.

— Pilosité du thorax moins développée, ne cachant pas la sculpture, même chez les individus frais ; la distance interoculaire égale la longueur des 2 premiers articles du funicule réunis 10

10. Extrémité de l'abdomen noire ; pilosité du clypéus dorée ; peigne moins

développé .... *T. palopterus* Dhlb.

— Abdomen souvent entièrement rouge ; pilosité du clypéus souvent argentée ; peigne plus développé .... *T. panzeri* v. d. Lind.

11. Abdomen noir ; pattes presqu'entièrement noires ; ailes antérieures fortement enfumées .... *T. chephren* nov. spec.

— Abdomen et pattes au moins en partie rouges ; ailes souvent hyalines .. 12

12. Ailes antérieures jaunâtres au milieu ; palpes et langue longs .... *T. longipalpis* nov. spec.

— Ailes antérieures hyalines ou enfumées régulièrement sur toute leur surface ; palpes et langue courts ; espèces que l'on ne distingue sûrement que par l'étude de l'armature génitale 13

13. Ailes antérieures en général nettement enfumées ; pas de pruinosité argentée à l'abdomen .... *T. gracilicornis* Mercet

— Ailes antérieures pas ou peu enfumées ; en général des bandes de pruinosité argentée à l'abdomen 14

14. Abdomen noir à l'extrémité ; peigne plus développé .... *T. palopterus* Dhlb.

— Abdomen souvent entièrement rouge ; peigne moins développé .... *T. pygidialis* Kohl

15. Abdomen entièrement noir 16

— Abdomen au moins en partie rouge 31

16. Segment médiaire et base du premier tergite recouverts d'une abondante pilosité laineuse ; pilosité de la face dressée et presque toujours en partie noire ou brune .... *T. albocinctus* Lucas

— La pilosité du segment médiaire et, lorsqu'elle existe, de la base du premier tergite n'est pas laineuse ; pilosité de la face jamais brune ou noire 17

17. Tibias plus ou moins rouges 18

— Tibias entièrement noirs 23

18. Le bord antérieur du clypéus forme au milieu un angle très prononcé 19

— Bord antérieur du clypéus tronqué ou arrondi 20

19. Côtés du segment médiaire en général finement striés ; échancrure des

fémurs antérieurs portant au fond une petite lamelle verticale .... *T. julliani* Kohl

— Côtés du segment médiaire non striés ; pas de lamelle dans l'échancrure des fémurs antérieurs .... *T. abjectus* Kohl

20. La distance interoculaire égale la longueur des 3 premiers articles du funicule réunis ; extrémité des tergites jaunâtre, décolorée .... *T. fasciatus* Morice

— La distance interoculaire égale au plus la longueur des 2 premiers articles du funicule ; extrémité des tergites non décolorée 21

21. Echancrure des fémurs antérieurs rudimentaire ; base du premier tergite munie d'une pilosité dressée .... *T. maidli* nov. spec.

— Echancrure des fémurs antérieurs profonde ; base du premier tergite sans pilosité dressée 22

22. Tarse antérieur sans peigne rudimentaire ; des espaces (mats) entre les points sur le mésonotum ; taille plus faible .... *T. mantivora* nov. spec.

— Tarse antérieur avec un peigne plus ou moins développé ; pas d'espaces entre les points sur le mésonotum ; taille plus grande .... *T. grandissimus* Gussak.

23. Mésopleures sans suture épisternale ; cellule radiale très fortement tronquée à l'extrémité .... *T. imperfectus* nov. spec.

— Une suture episternale aux mésopleures ; cellule radiale moins fortement tronquée 24

24. Côtés du segment médiaire brillants, avec une ponctuation très fine et espacée ; face à sculpture très fine, d'aspect soyeux .... *T. plicosus* Costa

— Côtés du segment médiaire plus ou moins nettement striés ; face ponctuée ou chagrinée 25

25. Articles du funicule à peine plus longs que larges, avec, sur la ligne dorsale une limite nette entre la face antérieure, plus mate, et la face postérieure, plus brillante .... *T. cabrerai* Mercet

— Articles médians du funicule nettement plus longs que larges, leur face antérieure et postérieure à sculpture semblable 26

26. Tarse antérieur avec un peigne formé d'épines blanches ; mésopleures à ponctuation peu nette en arrière 27

— Tarse antérieur dépourvu de peigne ; mésopleures à ponctuation nette sur toute leur surface 29

27. Vertex très large et concave vu de face ; mésopleures mates ; mésonotum très brillant, avec quelques points isolés, etc. ..... *T. priesneri* nov. spec.

— Vertex plus étroit, non concave ; mésopleures brillantes ; mésonotum à ponctuation plus dense, etc. 28

28. Articles du funicule plus longs .... *T. filicornis* Kohl

— Articles du funicule plus courts .... *T. helveticus* Kohl

29. Clypéus formant un angle net au milieu de son bord antérieur .... *T. nitidus* Spin.

— Clypéus ne formant pas d'angle au milieu de son bord antérieur 30

30. Ponctuation plus fine et plus serrée .... *T. tarsinus* Lep.

— Ponctuation plus forte et plus espacée ; mandibules souvent en partie jaunâtres .... *T. nitidior* nov. spec.

31. Le plus grand éperon des tibias postérieurs avec des dents espacées et très fortes ; mésonotum avec une forte sculpture aréolée ; ailes antérieures avec une bande enfumée .... *T. schmiedeknechti* Kohl

— Le plus grand éperon des tibias postérieurs avec, comme d'habitude, des dents fines et serrées ; mésonotum ponctué ; ailes antérieures sans bande enfumée 32

32. Tibias entièrement noirs .... *T. pectinipes* L.

— Tibias au moins en partie rouges 33

33. Ailes, sauf leur base et leur bordure, jaunâtres ; face fortement convexe. revêtue d'une dense pilosité dorée .... *T. isis* nov. spec.

— Ailes hyalines ou légèrement et uniformément et légèrement enfumées 34

34. Premier sternite caréné ; distance interoculaire faible ; tempes pratiquement absentes dans le haut 35

— Premier sternite non caréné ; distance interoculaire plus grande ; tempes plus ou moins développées 36

35. Mésonotum et scutellum brillants, avec des espaces entre les points .... *T. osiris* nov. spec.

— Mésonotum et scutellum mats, sans espaces entre les points .... *T. grandissimus* Gussak.

36. Le bord antérieur du clypéus forme au milieu un angle très prononcé ;

pilosité de la tête et du thorax relativement peu développée ....
.... *T. julliani* Kohl

— Le bord antérieur du clypéus ne forme pas d'angle au milieu ; pilosité de la tête et du thorax très dense 37

37. Face moyennement bombée .... *T. vestitus* Kohl

— Face très fortement bombée .... *T. deserticola* nov. spec.

GROUPE DE *PANZERI* V. D. LIND.

Caractérisé surtout par la forme des pièces buccales. Labre dépassant nettement le bord antérieur du clypéus lorsque les pièces buccales sont repliées, arrondi ou pointu en avant, bombé. Galea des maxilles nettement plus longue que large, presque aussi longue que le scape sans son bouton articulaire. Sculpture toujours fine.

Groupe difficile. Pour les ♂♂, l'étude de l'armature génitale est souvent indispensable.

Tachysphex panzeri v. d. Lind.

Morphologiquement, la ♀ se reconnait en général à la forme du bord antérieur du clypéus et à son aire pygidiale allongée, microscopiquement chagrinée. La pilosité est relativement peu développée. L'abdomen peut être plus ou moins noir à l'extrémité ou entièrement rouge (var. *oraniensis* Lep.). Taille très variable (8-19 mm.).

Le ♂ est souvent difficile à distinguer des espèces voisines. Comme beaucoup d'entre elles, il porte un peigne rudimentaire assez développé au tarse antérieur.

Espèce répandue dans toute la région paléarctique. En Egypte, elle habite généralement les régions sablonneuses ou désertiques depuis le littoral et jusqu'à Assouan, pendant les mois d'Avril à Octobre.

Tachysphex cheops nov. spec.

Espèce voisine de *panzeri* v. d. Lind.

La ♀ s'en distingue par l'aire apicale du clypéus plus courte et plus bombée, les antennes plus longues, la distance interoculaire au vertex plus courte, les fémurs plus épais, les tarses moins grêles, l'aire pygidiale souvent plus brillante, mais à surface plus irrégulière, la pilosité plus développée sur la face et le thorax.

Le ♂ s'en distingue par la pilosité plus développée sur la tête et le thorax, par la distance interoculaire plus courte. Les 3 premiers tergites sont recouverts d'une pruinosité argentée assez dense, tandis que sur les sui-

vants, elle est brun foncé, ce qui donne à l'abdomen un aspect bicolore nettement tranché. Armature bien différente de celle de *panzeri* v. d. Lind.

Type (♀) : Route de Suez, 19.X.1935 (collection A. Mochi); allotype (♂) : El Arish (Sinaï), 4.IX.1930 (collection A. Alfieri).

Outre l'Egypte (mêmes habitat et époques que pour *Tachysphex panzeri* v. d. Lind.) et le Sinaï, je connais cette espèce de Cyrénaïque.

Tachysphex buyssoni Morice

Espèce ressemblant, à première vue, aux deux précédentes (*panzeri* v. d. Lind. et *cheops* nov. spec.), mais s'en distinguant immédiatement par l'échancrure très large des madibules; la partie basale, avant l'échancrure, n'est pas plus longue que large et se termine par un angle proéminent.

J'ai vu les types de cette espèce décrite d'Egypte et retrouvée au Sinaï (Wadi Mitla). Régions sablonneuses ou désertiques, d'Avril à Juillet.

Tachysphex micans Radoszkowski

Reconnaissable à sa pilosité très développée et à la structure du grand éperon des tibias postérieurs : les dents sont beaucoup plus fortes et moins serrées que chez les autres espèces du groupe.

Espèce que l'on rencontre surtout dans l'Asie occidentale (Turkestan).

J'ai précédemment étudié des spécimens de la collection Radoszkowski.

Egypte : Route de Suez, 4me Tour, 20.IV.1914 (collection Ministère de l'Agriculture); Katta, 10.VII.1935 (collection A. Alfieri). — Sinaï: Wadi Feïran, 28.V.1935 (collection A. Alfieri).

Tachysphex chephren nov. spec.

Bien reconnaissable à sa coloration noire et ses ailes enfumées. Articles du funicule plus longs que chez *panzeri* v. d. Lind.. Mésonotum et scutellum assez brillants, avec une ponctuation très fine.

Type (♀) : Wadi Hoff, 18.VIII.1925 (collection A. Alfieri); allotype (♂) : Wadi Hoff, 18.VIII.1925 (collection A. Alfieri).

L'espèce semble confinée à l'Egypte, mais il existe dans le nord-ouest de l'Afrique une espèce ayant tout à fait le même aspect : *notogoniaeformis* Nadig.

Tachysphex pygidialis Kohl

La ♀ se distingue de *panzeri* v. d. Lind. par son aire pygidiale plus large et brillante, ainsi que par la forme du bord antérieur du clypéus qui montre près de ses angles latéraux un petit décrochement caractéristique, disparaissant souvent chez les individus usés.

Le ♂ se distingue de celui de *panzeri* v. d. Lind. par le peigne rudimentaire du tarse antérieur absent ou très peu développé. Il est souvent difficile à distinguer de certaines espèces et l'étude de l'armature génitale est souvent nécessaire.

Fig. 1. — *Tachysphex pygidialis* Kohl : Bord antérieur du clypéus de la femelle.

Espèce que l'on rencontre dans une grande partie de la région paléarctique. En Egypte, elle s'étend depuis le littoral méditerranéen jusqu'à Assouan, de Mars à Septembre.

La forme habituelle de l'Egypte correspond à *nattereri* Kohl dont j'ai vu le type. Elle se distingue de la forme européenne par son abdomen entièrement rouge et par l'absence totale de stries aux côtés du segment médiaire.

J'ai placé à la suite des *pygidialis nattereri* Kohl cinq ♀♀ qui sont un peu différentes. Les deux premières ont une aire pygidiale plus étroite, des redents peu marqués au clypéus et l'extrémité de l'abdomen noire ; les trois autres ont l'abdomen entièrement rouge, mais l'aire apicale du clypéus est plus bombée et la distance interoculaire plus courte. Espèces ou simples variétés ?

Tachysphex gracilicornis Mercet

Espèce voisine, morphologiquement, de *pygidialis* Kohl. Le ♂ ne s'en distingue souvent que par la structure de son armature. La ♀, par contre, se reconnaît facilement à ses ailes enfumées. Clypéus sans redents. Côtés du segment médiaire en général avec quelques stries nettes.

Espèce que l'on rencontre surtout en Algérie et au Maroc. Le seul individu que j'ai vu d'Egypte provient de Solloum, Avril 1920 (collection A. Alfieri).

Tachysphex palopterus Dahlb.

Espèce très difficile à définir. Le ♂, dont j'ai vu le type, se distingue de *pygidialis* Kohl par son peigne en général un peu plus développé. L'abdomen est noir à l'extrémité, ce qui le distingue de la plupart des *panzeri* v. d. Lind. d'Egypte. L'étude de l'armature génitale est ici indispensable.

J'ai attribué provisoirement comme ♀♀ à ces ♂♂ des individus qui se distinguent de *pygidialis* Kohl par l'aire apicale du clypéus plus courte et plus bombée, sans redents au bord antérieur. L'aire pygidiale est large, parfois un peu chagrinée. Coloration variable.

Il est évident que de nouvelles recherches seraient nécessaires pour tirer définitivement cette espèce au clair.

Vu une demie douzaine d'individus provenant des régions désertiques en bordure du Caire, capturés de Mars à Octobre, et un exemplaire de Solloum (12.IX.1917). J'ai également vu des ♂♂ de Tunisie et de Biskra.

Tachysphex mycerinus nov. spec.

La ♀ est caractérisée par ses formes ramassées, ses pattes courtes, son clypéus sans échancrure médiane, son aire pygidiale large, très brillante et très bombée.

fie ♂ est souvent difficile à distinguer de *panzeri* v. d. Lind. et de *paloptерus* Dahlb.. Il porte un peigne rudimentaire au tarse antérieur ; le bord antérieur du clypéus est proéminent. Pilosité de la face argentée dans le bas, dorée dans le haut (ce que l'on rencontre aussi chez d'autres espèces).

Type (♀) : Le Caire ; allotype (♂) : Massara, 24.IV.1914 (collection du Ministère de l'Agriculture). — Divers autres individus, capturés de Mars à Octobre, provenant des régions désertiques des environs du Caire.

L'espèce se retrouve en Tunisie.

Tachysphex longipalpis nov. spec.

Pièces buccales très allongées, en particulier les palpes et la langue. (Je n'ai pas pu voir, chez la seule ♀ que j'ai examinée, si la langue était aussi longue que chez le ♂). Abdomen rouge, sans pruinosité, ce qui lui donne un aspect particulier. Clypéus de la ♀ sans échancrure au milieu du bord antérieur. Chez le ♂, l'échancrure de la base des fémurs antérieurs est très peu profonde ; le peigne du tarse est peu développé.

Type (♀) : Giza, 3.VIII.1925 (Collection A. Alfieri) ; allotype (♂) : Choubrah, 30.VI.1926 (collection A. Alfieri). — Divers autres individus capturés dans les régions désertiques ou sablonneuses des environs du Caire, de Février à Juin.

Autres espèces du groupe de *panzeri* v. d. Lind.

N° 1. — Espèce aff. *panzeri* v. d. Lind. : Se distingue, de *panzeri* v. d. Lind., par l'aire pygidiale qui est brillante, plus nettement bordée et presque plane. Pruinosité abdominale assez développée.

Une ♀, Hélouan, 21.IV.1934 (collection A. Alfieri) ; Helouan, 24.IV.1934 ; Khanka, 27.V.1914 ; Ikinghi Mariout, 16.V.1915 (collection Ministère de l'Agriculture).

N° 2. — Espèce aff. *cheops* nov. spec. : S'en distingue par la taille plus faible, les téguments du thorax et du segment médiaire plus brillants. Le mésonotum présente une ponctuation fine et serrée.

Une ♀, Aboukir, 4.VII.1912 (collection A. Alfieri).

N° 3. — Espèce du groupe de *panzeri* v. d. Lind. : Ressemble comme coloration à *panzeri oraniensis* (Lep.) Kohl. S'en distingue par la pilosité du thorax plus développée et jaune; sur l'abdomen aussi, la pruinosité est jaune et, de ce fait, ne forme pas de bandes nettement visibles. Aire pygidiale plus étroite et plus brillante.

Une ♀ du Wadi Hussein, 1.VI.1919 (collection Ministère de l'Agriculture).

N° 4. — Espèce du groupe de *panzeri* v. d. Lind. : Très probablement le ♂ et la ♀ d'une même espèce, mais en mauvais état. Taille faible. Clypéus jaune. Abdomen brun-rouge, avec l'extrémité des tergites décolorée et une pilosité assez développée, surtout sur le premier tergite.

Un ♂ du Fayoum, 6.VI.1931 (collection A. Mochi); une ♀ du Wadi Hussein, 31.V.19 (collection Ministère de l'Agriculture).

N° 5. — Espèce aff. *pygidialis* Kohl : Abdomen noir; 3e cellule cubitale très large. Armature différente de celle de *pygidialis* Kohl.

Un ♂, Wadi Um Biar (à l'est de Kosseir), 17.II.1924 (collection Ministère de l'Agriculture).

N° 6. — Espèce du groupe de *panzeri* v. d. Lind. : Aspect d'un petit *panzeri* v. d. Lind.. Armature différente.

Un ♂, Gebel Asfar, 31.V.1936 (collection A. Mochi).

N° 7. — Espèce aff. *cheops* nov. spec. : S'en distingue par la taille plus faible, le clypéus sans échancrure, le funicule ferrugineux, la pilosité du thorax plus développée.

Une ♀, Ismailia, 29.VII.1925 (collection A. Alfieri).

Groupe de *LUXURIOSUS* Morice

Le labre et les pièces buccales sont comme dans le groupe de *panzeri* v. d. Lind.. Distance interoculaire au vertex grande. Sculpture plus forte que dans le groupe *panzeri* v. d. Lind.. Pas d'échancrure au fémur antérieur du ♂, ce qui distingue ces espèces de tous les autres *Tachysphex* paléarctiques. Elles ne se retrouvent pas dans le reste de l'Afrique du Nord.

Tachysphex luxuriosus Morice

La ♀ a l'abdomen entièrement rouge, de même que les pattes (chez un individu du Musée de Berlin, les téguments sont entièrement rouges). Pilosité très développée, cachant presqu'entièrement la sculpture de la tête et du thorax chez les individus frais. Aire pygidiale peu nettement bordée.

Les autres caractères morphologiques semblables à ceux de toutes les espèces du groupe. Comparée avec le type de Morice.

Les ♂ a les pattes en partie noires. Le tarse antérieur porte des épines parfois assez longues, mais ne formant pas de véritable peigne : il n'y a qu'une épine à l'extrémité des articles 1 et 2.

Fayoum, Hélouan, régions désertiques ou sablonneuses aux environs du Caire, d'Avril à Juin.

Tachysphex horus nov. spec.

♀ : Extrémité de l'abdomen plus ou moins obscurcie. Pilosité moins développée que chez le précédent. Pattes en bonne partie noires.

Morphologiquement, se distingue à peine de *luxuriosus* Morice : les côtés du segment médiaire semblent en général striés ; l'aire pygidiale est plus nette.

♂ : Je considère comme ♂ de ces ♀♀ des individus qui se distinguent des précédents par la couleur noire plus étendue et la pilosité moins développée. Ils s'en distinguent surtout par la présence d'un peigne rudimentaire beaucoup plus développé au tarse antérieur. L'armature est différente.

Type (♀) : Heliopolis, 28.IV.1913 ; allotype (♂) : Assiout, 31.III.1917 (collection Ministère de l'Agriculture) ; Fayoum, Route de Suez, Abou Rouache, Gebel Asfar, etc., de Mars à Octobre.

Autres espèces du groupe de *luxuriosus* Morice

N° 8. — Un ♂ et des ♀♀ semblent appartenir à la même forme. Coloration encore plus foncée que chez *horus* nov. spec. et pilosité moins développée. Tarse antérieur du ♂ avec un peigne. Armature différente de celle de *horus* nov. spec.. Semble être une bonne espèce.

Gebel Asfar, 29.III. 1937 et Fayoum, 8.III.1936 (Collection A. Mochi).

N° 9. — Coloration comme chez *luxuriosus* Morice, pas de peigne au tarse antérieur, mais armature ressemblant à celle de *horus* nov. spec.

Un ♂, Ezbet Nahlé, 12.VII.1936 (collection A. Mochi).

N° 10. — Coloration comme chez *horus* nov. spec., mais pas de peigne. Armature spéciale.

Un ♂, Meadi, 7.VI.1912 (collection Ministère de l'Agriculture).

Groupe de *BICOLOR* Br. (=*SPOLIATUS* Gir.)

Ne semble pas représenté en Egypte. Je connais cependant de Cyrénaïque une espèce nouvelle, qui se distingue de *spoliatus* Gir. (qui doit se nommer *bicolor* Br.) par ses pattes entièrement noires et son mésonotum brillant. Peut-être retrouvera-t-on cette forme en Egypte.

GROUPE DE *FLUCTUATUS* GERST.

J'ai défini dans mon travail sur les *Tachysphex* de France (2) les caractéristiques de ce groupe (premier sternite caréné, deuxième sternite avec une plateforme à la base, etc.). J'ajouterai qu'à partir de ce groupe, les espèces ont toutes le labre peu développé, presqu'entièrement caché par le clypéus et que la galea des maxilles est courte.

Tachysphex mantivora nom. nov.

(=*fluctuatus* Kohl, nec Gerst.)

Abdomen entièrement noir dans les deux sexes.

♀ : Bord antérieur du clypéus tronqué droit, avec une petite échancrure médiane. Ponctuation du mésonotum plus ou moins dense. Aire pygidiale assez fortement bombée, à bords latéraux peu nets.

♂ : Echancrure du fémur antérieur profonde. Tarse antérieur sans peigne.

Toute la région méditerranéenne.

Egypte: Alexandrie, Aboukir, régions désertiques aux alentours du Caire, Fayoum, d'Avril à Novembre. — Sinaï : Ein Moussa, en Septembre.

Tachysphex maidli nov. spec.

Abdomen entièrement noir dans les deux sexes.

Se distingue de *mantivora* nom. nov. par ses téguments plus mats, sa pilosité plus développée, en particulier sur les fémurs et sur le premier tergite, la ♀ de plus par le bord antérieur du clypéus plus arqué, l'aire pygidiale moins bombée et plus nettement bordée, le ♂ par l'échancrure très rudimentaire de ses fémurs antérieurs et par la présence d'un peigne rudimentaire à son tarse antérieur.

Type (♀): El Arish (Sinaï), 20.V.1921 ; allotype (♂) : Helouan, 27.V.1930 (collection A. Alfieri). — Mariout, Damiette, régions désertiques aux alentours du Caire, de Mars à Août.

Se retrouve en Cyrénaïque et au Maroc.

Tachysphex grandissimus Gussakovskij

Je crois pouvoir rapporter à cette espèce, décrite de Perse, les individus présentant les caractères suivants :

L'abdomen de la ♀ est rouge à la base, celui du ♂ noir ou ferrugineux très foncé sur les premiers tergites.

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(2) Jacques de Beaumont : Les *Tachysphex* de la faune française (*Annales de la Société Entomologique de France*, Vol. CV, 3e trim., 1936, pp. 198-199).

Se distingue des deux précédents par sa taille plus forte, par la ponctuation très dense du mésonotum, la pilosité plus développée. Chez la ♀, le bord antérieur du clypéus est à peine échancré au milieu, l'aire pygidiale est nettement rétrécie en arrière. Chez le ♂, l'échancrure des fémurs antérieurs est nette, le peigne du tarse antérieur est peu développé.

Egypte: Régions désertiques ou sablonneuses aux environs du Caire, Oasis de Dakhla (désert libyque), de Mai à Septembre. — Sinaï : Romani, 14.IX.1916.

Egalement connu de la Perse, de la Cyrénaïque et du Maroc.

(Tachysphex sordidus Dahlb.)

Cette espèce, dont j'ai vu le type, a été décrite d'Egypte par Dahlbom. Cependant, comme tous les autres exemplaires que j'ai vus provenaient de Chypre ou de Rhodes, je pense qu'il y a erreur sur la provenance, erreur d'autant plus vraisemblable que la collection Hedenborg, d'où l'espèce a été décrite, contient surtout des spécimens d'Egypte et de Rhodes. Comme il est cependant possible que l'espèce puisse se retrouver en Egypte, je signale ses particularités :

Très voisine de *grandissimus* Gussakovskij. Chez la ♀, la base de l'abdomen est d'un rouge très sombre, chez le ♂, elle est en général noire. Taille en moyenne un peu plus faible que chez *grandissimus* Gussakovskij ; pilosité moins développée ; ponctuation du mésonotum moins dense. Chez la ♀, les tempes sont plus développées en arrière des yeux que chez les espèces voisines ; l'aire apicale du clypéus est également plus développée ; son bord antérieur présente une petite dent près des angles latéraux, eux-mêmes saillants. Le ♂ se distingue de celui de *mantivora* nom. nov. par sa distance interoculaire plus faible et par le peigne rudimentaire du tarse antérieur plus développé.

(Tachysphex costai Destef.)

Je ne connais pas de spécimens égyptiens de *Tachysphex costai* Destef., mais comme cette espèce se trouve en Cyrénaïque, il est possible qu'on la rencontre aussi en Egypte.

Morphologiquement, très voisine de *mantivora* nom. nov., mais la base de l'abdomen est rouge dans les deux sexes.

Pourtour de la Méditerranée.

Tachysphex osiris nov. spec.

♀ : Téguments en grande partie ferrugineux. Pilosité argentée extrêmement dense sur la tête et le thorax. Face assez fortement bombée. Autrement assez semblable morphologiquement aux espèces précédentes.

♂ : Je n'ai pas vu d'individus frais. Tous ceux que j'ai étudiés avaient la pilosité en grande partie arrachée, mais cette pilosité semble en tous cas être beaucoup moins développée que chez la ♀. Ne sont rouges qu'une partie des fémurs, les tibias et les tarses, les premiers tergites abdominaux. Le ♂ est voisin de celui de *costai* Destef. ; il s'en distingue par la présence d'un peigne au tarse antérieur et par la distance interoculaire plus grande.

Une ♀ d'Assouan, 3.XI.1921 (collection A. Alfieri), est le seul représentant de l'espèce pour l'Egypte. Les autres spécimens étudiés proviennent du désert nubique, de Cyrénaïque et du sud de l'Algérie.

Tachysphex isis nov. spec.

Devrait former un groupe à part. L'espèce se distingue en effet des précédentes par l'absence de carêne longitudinale au premier sternite et l'absence de franges à l'extrémité des sternites du ♂. La structure générale du corps, la nervulation, etc., la rapprochent cependant des autres espèces du groupe de *fluctuatus* Gerst.

La ♀ ressemble au premier abord, par la pilosité très développée de sa tête et de son thorax, à *osiris* nov. spec. Elle s'en distingue cependant facilement, outre les caractères cités ci-dessus, par la face beaucoup plus bombée et par la forme du clypéus.

Le ♂ est très différent de la ♀. La pilosité est en effet beaucoup moins développée, les ailes sont en partie enfumées. La structure du corps très semblable et la concordance des lieux de capture me font croire cependant qu'il s'agit bien du ♂ des ♀♀ ci-dessus.

Type (♀) et allotype (♂) : Wadi Rishrash, 12.V.1935 (collection A. Alfieri).

Cette espèce se retrouve en Cyrénaïque.

Groupe de *SCHMIEDEKNECHTI* Kohl

Se rapproche du groupe précédent par plusieurs caractères, mais s'en distingue très nettement par la sculpture du thorax et par les dents très fortes du grand éperon des tibias postérieurs.

Tachysphex schmiedeknechti Kohl

Outre les particularités du groupe, on reconnaît facilement cette espèce à ses ailes enfumées avant l'apex. Trompé par le dimorphisme sexuel de coloration, Kohl a décrit séparément le ♂ sous le nom de *psilopus*.

Goubbet El Bous, Galala, Hélouan, Fayoum, Gebel Asfar, Sakkara, Abou Rawash, Oasis de Khargha et de Dakhla, de Mars à Novembre.

Groupe d'*ALBOCINCTUS* Lucas

C'est encore un groupe assez voisin de celui de *fluctuatus* Gerst.. Les espèces sont cependant bien caractérisées par leur abondante pilosité laineuse, surtout sur la face et le segment médiaire. La sculpture de l'aire pygidiale de la ♀ est très particulière.

Tachysphex albocinctus Lucas

(=*ruficrus* Dufour, *syriacus* Kohl, *mantiraptor* Ferton, *heliopolites* Morice ♂ [nec ♀], dont j'ai vu les types).

Espèce très caractéristique et que l'on reconnaît facilement. Chez les ♂♂ la pilosité de la face est en général noirâtre ou brune; chez les petits spécimens par contre, elle devient blanche (*heliopolites* Morice).

Région méditerranéenne, Afrique.

Faraskour, Gebel Asfar, Giza, Abou Rawash, Oasis de Dakhla, Mai à Novembre.

Groupe de *JULLIANI* Kohl

Il est difficile de donner une définition de ce groupe, caractérisé surtout par une forme particulière de l'armature génitale du ♂. Par le segment médiaire tronqué en arrière, les espèces se rapprochent encore des précédentes. L'aire pygidiale des ♀♀ est en général large et souvent divisée d'avant en arrière en deux zones, différemment sculptées. Chez le ♂ aussi, le 7me tergite est en général large, brillant, à ponctuation espacée. Ils ont tous au tarse antérieur un peigne bien développé.

Tachysphex julliani Kohl

Voir la description dans mon travail sur les *Tachysphex* de France [3]. La ♀ est caractérisée par la structure de son aire pygidiale, le ♂ par son clypéus dont le bord antérieur est prolongé par une petite dent triangulaire aigue et par la présence, au fond de l'échancrure des fémurs antérieurs, d'une petite lamelle, souvent difficile à distinguer. Espèce très voisine de la suivante (*abjectus* Kohl). L'abdomen peut être noir ou plus ou moins rouge.

Région méditerranéenne.

Un ♂, Wadi Hoff, 15.III.1935 (collection A. Mochi); 1 ♂, Wadi Abou Handal, 28.III.1918 (collection Ministère de l'Agriculture). — Je n'ai pas vu de ♀ d'Egypte.

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[3] Jacques de Beaumont : Les *Tachysphex* de la faune française (*Annales de la Société Entomologique de France*, Vol. CV, 3e trim., 1936, pp. 199-200).

Tachysphex abjectus Kohl

Abdomen entièrement noir. Se distingue de *julliani* Kohl par le mésonotum plus brillant et moins ponctué, les côtés du segment médiaire jamais striés, la ♀ de plus par son clypéus plus aplati, les premiers articles du funicule plus longs, la distance interoculaire plus courte, le ♂ par l'absence de lamelle dans l'échancrure du fémur antérieur.

Asie occidentale, Biskra.

2 ♂♂, Wadi Hoff, 15.III.1935 (collection A. Mochi). — Je n'ai pas vu de ♀ d'Egypte.

Tachysphex vestitus Kohl

Pilosité de la tête et du thorax très dense.

♀ : Clypéus tout à fait aplati. Face assez fortement bombée. Aire pygidiale à sculpture et forme caractéristiques. Chez le ♂ aussi, le clypéus est très plat.

Route de Suez, Kerdacé, Fayoum, Wadi Um Assaad, Waḍi Assiouti, d'Avril à Octobre.

Se retrouve dans le sud algérien.

(Tachysphex incanus nov. spec.)

Je ne connais pas cette espèce d'Egypte, mais elle s'y rencontrera peut-être, car on la trouve en Cyrénaïque et dans le sud algérien.

Voisine de *Tachysphex vestitus* Kohl. La ♀ s'en distingue par une pilosité un peu moins abondante et par sa distance interoculaire un peu plus faible. La structure de l'aire pygidiale est très caractéristique : elle est mate, divisée en deux zones par une ligne transversale nette; l'aire basale est fortement granuleuse, l'aire apicale finement striée longitudinalement. Clypéus plus proéminent au milieu de son bord antérieur. Le ♂ (?) se distingue du *Tachysphex vestitus* Kohl par sa distance interoculaire plus courte.

Tachysphex deserticola nov. spec.

Espèce voisine des deux précédentes par la structure générale de son corps, sa coloration, sa pilosité. Les deux sexes s'en distinguent par la face plus fortement bombée, la distance interoculaire plus grande, la ♀ de plus par l'absence de particularités à l'aire pygidiale, le ♂ à la faible échancrure de ses fémurs antérieurs.

Oasis de Kharga, 2 ♀♀ (type et co-type), 19.IV. 1917 (collection du Ministère de l'Agriculture).

(Groupe de *LATIVALVIS* Thoms.)

Caractérisé, entre autres, par la structure des tarses. Ne semble pas représenté en Egypte.

Groupe de *MEDITERRANEUS* Kohl

Se distingue surtout, des suivants, par la structure de l'armature génitale du ♂ (4).

Tachysphex plicosus Costa

(= *gallicus* Kohl)

Espèce entièrement noire, à sculpture très caractéristique. Voir en particulier l'aspect mat de la face, les fortes stries sur la face dorsale du segment médiaire, les côtés de ce dernier brillants avec une très fine ponctuation, etc.

Région méditérranéenne.

1 ♀, Marg. 7.IV.1910; 1 ♂, Ezbet El Nakhlé, 27 III.1914 (collection A. Alfieri).

Groupe de *PECTINIPES* L.,

NITIDUS Spin. et *SPECIOSISSIMUS* Morice

Les espèces appartenant à ces groupes sont difficiles à grouper. Ce sont, en somme, les espèces qui n'ont pas les particularités des groupes précédents. Les pièces buccales sont courtes, le clypéus aplati, le segment médiaire tronqué obliquement en arrière, la cellule anale des ailes postérieures étroite à l'extrémité. L'armature génitale des ♂♂ est d'un type assez uniforme. Comme les espèces sont nombreuses, il n'est guère possible de les réunir en un groupe unique et il me semble préférable de faire 3 groupes, basés surtout sur la coloration et la sculpture.

Groupe de *NITIDUS* Spin.

Abdomen et pattes entièrement noirs (tarses plus ou moins ferrugineux). La sculpture du thorax est en général une ponctuation nette sur fond brillant; sur les mésopleures en particulier, il y a presque toujours des points nets. Ceux-ci disparaissent parfois plus ou moins, les mésopleures devenant alors brillantes. Groupe difficile. Dans mon travail sur les *Tachysphex* de France (loc. cit.), ces espèces étaient comprises dans le groupe de *pectinipes* L.

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(4) Voir Jacques de Beaumont : Les *Tachysphex* de la faune française (*Annales de la Société Entomologique de France*, Vol. CV, 3e trim., 1936, p. 210).

Dans ce même travail, j'avais distingué trois variétés dans l'espèce habituellement nommée *nitidus* Spin.. Il me semble maintenant que ces variétés sont de bonnes espèces, quoique difficiles à reconnaître. On les trouve, en effet, côte à côte dans presque toute la région paléarctique.

Tachysphex nitidus Spin.

(=*nitidus* var. A de mon travail) (5)

Chez la ♀, la partie apicale brillante du clypéus est aussi longue ou plus longue au milieu que la partie basale ponctuée ; la limite entre les deux aires n'est pas toujours nette. Ponctuation de la face très serrée. Le ♂ est reconnaissable à un clypéus qui forme en avant un angle accusé.

Ezbet El Nahlé, Meadi, El Mallah, Fayoum, Dekhela et Ikinghi Mariout, de Décembre à Avril.

Tachysphex tarsinus Lep.

(= *nitidus* var. B de mon travail) (6)

Chez la ♀, l'aire apicale brillante du clypéus est plus courte que l'aire basale pontuée. Ponctuation de la face plus fine. Le clypéus du ♂ n'est pas anguleux. Vertex un peu plus étroit à impression plus nette.

Meadi, Fayoum, Kerdacé, Mansouria, Gebel Asfar, Dekhela (Mariout), d'Avril à Août.

Tachysphex nitidior nov. spec.

(= *nitidus* var. C de mon travail) (7)

Les deux sexes se distinguent de l'espèce précédente par la ponctuation plus forte et plus espacée, en particulier sur la face et les mésopleures. La ♀ se reconnaît encore à son deuxième sternite à ponctuation beaucoup plus étendue ; l'impression à la partie antérieure du mésonotum, que je signalais dans mon précédent travail, n'est pas toujours nette. Chez le ♂, les mandibules sont souvent d'un ferrugineux pâle au milieu.

Ces trois espèces sont évidemment difficiles à distinguer, mais l'armature génitale des ♂♂ est très distincte.

1 ♂, Wadi Hoff, 3.VI.1936 (collection A. Mochi) ; 2 ♀♀, Ezbet El Nakhl, 2.VI.1914 (collection A. Alfieri).

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(5) Loc. cit., p. 206.
(6) Loc. cit., pp. 206-207.
(7) Loc. cit., p. 207.

Tachysphex helveticus var. aegyptiacus Morice

La ♀ se distingue des précédents par son clypéus tout à fait aplati et par ses mésopleures brillantes, à peine ponctuées en arrière. Le ♂ a la même sculpture que la ♀ ; on le reconnaît de plus à la présence d'un peigne rudimentaire à son tarse antérieur.

La var. *aegyptiacus* Morice se distingue, de la forme typique d'Europe (*helveticus* Kohl), par la ponctuation beaucoup plus espacée de son mésonotum.

Choubrah, Meadi, Helouan, Ezbet Nahlé, Kerdacé, Gebel Asfar, de Février à Novembre.

Tachysphex filicornis Kohl

Espèce voisine de la précédente par la structure de son clypéus, sa sculpture, la présence d'un peigne au tarse antérieur du ♂. S'en distingue, la ♀ surtout, par ses antennes beaucoup plus longues.

Hélouan, Ezbet Nahlé, Abou Zabal, Gebel Asfar, Avril à Novembre.

Toute la région méditerranéenne, Afrique.

Tachysphex cabrerai Mercet

Petite espèce, à mésopleures très brillantes. Chez la ♀, la face inférieure du scape et l'extrémité de l'aire pygidiale sont en général tachées de ferrugineux. Le ♂ est reconnaissable à la structure particulière de ses articles du funicule (voir mon travail précédent [loc. cit., pp. 209-210]).

Gebel Asfar, Helouan, Cheikh Fadl, de Mai à Octobre.

Tachysphex priesneri nov. spec.

Espèce assez différente des précédentes et bien caractérisée par son mésonotum brillant, la sculpture de ses mésopleures, son vertex large et concave, sa pilosité très développée.

Type (♀) : Oasis de Khargha, 11.III.1924, et allotype (♂) : Oasis de Khargha (Wadi Ginah), 12.III.1924 (collection Ministère de l'Agriculture ; Wadi Um Assaad, 9.IV.1931 (collection A. Mochi).

Se retrouve dans le sud de l'Algérie.

Autres espèces du groupe de *nitidus* Spin.

N° 11. — Deux mâles caractérisés par leurs téguments très brillants, leur clypéus anguleux en avant et la structure de leur funicule : les articles 2, 3 et 4 sont très courts, le 5e presqu'aussi long que les articles 3+4.

Wadi Hoff, 15.III.1936 (collection A. Mochi).

N° 12. — Un ♂ très voisin des précédents, mais la longueur relative des articles du funicule est normale. Face à ponctuation moins distincte.

Route de Suez, 21.VI.1936 (collection A. Mochi).

N° 13. — Peut-être la même espèce que le précédent, mais la sculpture est un peu différente.

Sinaï: Un individu du Wadi Feïran, 29-30.V.1935 (collection A. Alfieri).

N° 14. — Deux femelles qui me semblent être celles des ♂♂ N° 11 (voir la ponctuation du front).

Wadi Hoff, 15.III.1936 (collection A. Mochi).

N° 15. — Plusieurs femelles qui sont probablement celles du N° 12 (voir la ponctuation du front).

Beni Youssef, 15.IV.1934; Wadi Um Assaad, 8.IV.1934; Gebel Asfar 21 et 22.III.1936 (collection A. Mochi); Massara, 31.III.1916 (collection Ministère de l'Agriculture).

N° 16. — Un ♂ dont l'armature ressemble beaucoup à celle de *tarsinus* Lep., mais l'aspect extérieur est différent : front sans ponctuation nette; un peigne au tarse antérieur, etc.

Ezbet El Nakhlé, 11.III.1934 (collection A. Mochi).

Groupe de *PECTINIPES* L.

Pattes noires. Abdomen généralement rouge à la base. Mésopleures sans ponctuation distincte, mates.

(Tachysphex pectinipes L.)

(doit se nommer *pompiliformis* Pz.)

Je ne le connais pas d'Egypte, mais j'ai vu des spécimens de l'Ile d'Adelen (Schmiedeknecht).

Groupe de *SPECIOSISSIMUS* Morice

J'ai placé dans ce groupe, probablement hétérogène, les espèces plus ou moins voisines des précédentes par divers caractères, mais ayant les pattes en grande partie rouges.

Tachysphex speciosissimus Morice

Vertex, vu de face, concave. Ponctuation du mésonotum assez espacée. Un individu de Kafr Hakim, 21.V.1930 (collection du Ministère de l'Agri-

culture) correspond au type de Morice. Un autre exemplaire du Wadi Um Assaad, 9.IV.1934 (collection A. Mochi), avec la coloration noire un peu plus étendue (le vertex peut-être un peu plus étroit), correspond à *redivivus* Kohl. Il me semble cependant que c'est la même espèce. Le mâle est inconnu.

Tachysphex fasciatus Morice

Aspect très caractéristique, dû au bord décoloré des tergites. Sculpture fine. Clypéus de forme caractéristique, etc.. Outre une ♀ du Gebel Asfar, 14.IV.1935 (collection A. Mochi), je n'en ai vu que deux autres, le type de Morice et un individu de Biskra. Au musée de Vienne, il existe un ♂ qui est très probablement celui de cette espèce. Même sculpture et même coloration, mais pattes en partie noires.

Autres espèces du groupe de *speciosissimus* Morice

N° 17. — Espèce voisine de *Tachysphex speciosissimus* Morice, mais taille plus faible et ponctuation du mésonotum plus espacée. Aire pygidiale plus aigue. J'ai vu de Biskra deux individus semblables, mais à abdomen entièrement rouge. De Biskra aussi, j'ai vu deux ♂♂ d'une espèce probablement voisine, caractérisés par un profond sillon longitudinal à la partie antérieure du mésonotum.

Un individu du Wadi Um Assaad, 9.IV.1934 (collection A. Mochi).

N° 18. — Me semblent appartenir tous à la même espèce. Se distinguent facilement des précédents par la pilosité plus développée et par l'aspect mat du thorax, dû à une ponctuation très serrée. Aire pygidiale de la ♀ plus large. Abdomen et pattes rouges.

Borghash, 3.V.1934 (collection A. Alfieri); Sakkarah, Kerdacé et Oasis de Dakhla, Mai et Juin (collection Ministère de l'Agriculture).

Groupe de *BREVIPENNIS* Mercet

Groupe présentant une série de caractéristiques. Les mésopleures sont dépourvues de suture episternale. Cellule radiale largement tronquée, 3e cubitale large, pattes très peu épineuses, etc.. Arnold a créé, pour des formes voisines, le genre *Atelosphex*. A mon avis, ce genre ne peut pas subsister, même comme sous-genre. Il y a, en effet, entre ces espèces et celles du groupe de *pectinipes* L., des affinités évidentes.

Tachysphex imperfectus nov. spec.

Outre les caractéristiques du groupe, on reconnaît cette espèce à la forte striation du segment médiaire, à l'aire pygidiale mate. etc.. Chez les ♀♀

d'Algérie et de Tunisie, la coloration rouge est plus étendue, envahissant une partie de la face et des pattes. Je n'ai pas vu des ♂♂ d'Egypte.

Une ♀, Kerdacé, 8.VI.1932 (collection A. Alfieri); une ♀, Gebel Asfar, 4.X.1936 (collection A. Mochi).

Il existe d'autres espèces de ce groupe en Algérie et au Maroc. L'espèce type, *brevipennis* Mercet, se trouve en Espagne et au Maroc.

Groupe d'*HOLOGNATHUS* Morice

Très différent des autres *Tachysphex* et mériterait de former un sousgenre spécial : *Holotachysphex*.

Les particularités sont : mandibules sans échancrure au bord inférieur. Pas de peigne chez la ♀. Ponctuation très forte, en particulier sur l'abdomen. Une carêne très accusée sur les côtés du premier tergite et une ébauche de carêne semblable aux côtés du deuxième (passage aux *Prosopigastra*).

Tachysphex holognathus Morice

Très facilement reconnaissable aux caractères cités ci-dessus. Ne se trouve, semble-t-il, qu'en Egypte.

Un ♂, Zagazig, 5.VI.1913 (collection Ministère de l'Agriculture) ; une ♀, Kerdacé, 22.VII.1930 (collection A. Alfieri).

Séance du 18 Décembre 1940

Présidence de Monsieur le Professeur MAHMOUD TEWFIK HIFNAOUI Bey, *Président.*

Subvention :

Nous sommes heureux d'annoncer que le Conseil d'Administration de la SOCIÉTÉ GÉNÉRALE DES SUCRERIES ET DE LA RAFFINERIE D'EGYPTE a bien voulu nous octroyer une subvention annuelle de L.Eg. 25.

Nous remercions bien sincèrement le Conseil d'Administration de la Société, ainsi qui son Directeur Général, Monsieur H. NAUS, et leur exprimons ici notre vive gratitude.

Don à la Bibliothèque :

La Société a reçu un lot de 30 brochures diverses offertes par Monsieur A. ALFIERI.

Admission :

Sur la proposition de Messieurs le Professeur H. C. EFFLATOUN Bey et A. ALFIERI, Madame HEATH DAVIES est admise à faire partie de la Société en qualité de membre titulaire.

Rui

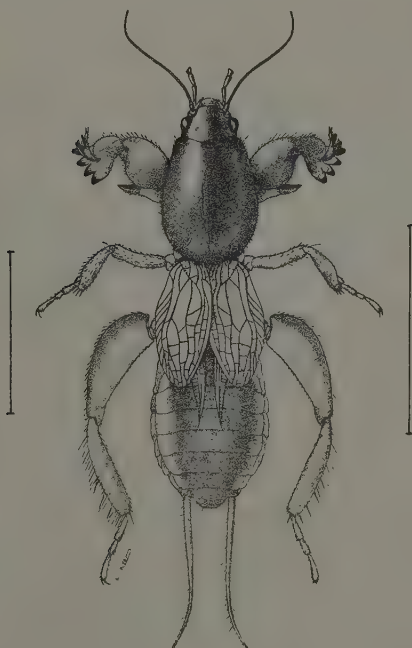
Sur une forme brachyptère inédite de *Gryllotalpa africana* P. de Bauv.

[Orthoptera : Gryllotalpidae]

(avec 1 Figure)

par Antoine Cassab

La Courtilière, en Egypte, était représentée par *Gryllotalpa gryllotalpa* Linné (=*vulgaris* Latr.) et sa forme brachyptère (=*cophta* de Haan), ainsi



Gryllotalpa africana P. de Bauv. : forme brachyptère.

que par *Gryllotalpa africana* P. de Bauv., dont les descriptions, illustrées d'une planche en couleurs, ont été données par l'auteur dans le Bulletin de

la Société Royale Entomologique d'Egypte, 1934, fascicule 4, pp. 421-426.

A cette époque, il n'avait pas été constaté de brachyptérisme chez *Gryllotalpa africana* P. de Bauv.

Des investigations ultérieures ont révélé, dès 1938, l'existence de nombreux individus de *Gryllotalpa africana* P. de Bauv. à ailes ne dépassant pas l'abdomen. Soumis à l'examen de Monsieur le Professeur H. Priesner, Directeur de la Section d'Entomologie du Ministère de l'Agriculture, il fut émis l'hypothèse qu'il s'agissait d'une forme brachyptère de *Gryllotalpa africana* P. de Bauv.. Monsieur L. Chopard, l'éminent spécialiste du Museum National d'Histoire Naturelle de Paris, auquel furent adressés quelques spécimens, confirma ce point de vue.

La biologie de cette nouvelle forme s'est avérée, à l'élevage, être entièrement pareille à celle de l'espèce type.

D'autre part, comme ce fut le cas pour la forme brachyptère de *Gryllotalpa gryllotalpa* Linné, il semblerait que la forme brachyptère du *Gryllotalpa africana* P. de Bauv. tend à remplacer l'espèce typique.

La description de *Gryllotalpa africana* P. de Bauv. forme brachyptère se résume comme suit :

Identique à *Gryllotalpa africana* P. de Bauv., s'en distingue par la longueur des ailes dépassant de peu les élytres au repos.

Sur la figure accompagnant cette note, les deux traits indiquent les dimensions naturelles minima et maxima de cette nouvelle forme.

Les premiers individus capturés proviennent des terrains d'alluvions à proximité du Nil des environs de Mansourah ; d'autres exemplaires ont été recueillis aux Barrages de Mehemet Aly et dans toute la province de Calioubieh, en Mars 1939. Sa présence dans la Haute Egypte n'a pas encore été constatée.

A study of the morphology and life history of *Sarcophaga falculata* Pandellé

[Diptera : Sarcophagidae]

(with Plates I-III)

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CONTENTS

I. INTRODUCTION AND ACKNOWLEDGMENTS

A study of the morphology and life history of *Sarcophaga falculata* Pand., the most common species of *Sarcophaga* in Egypt, has been made in the department of entomology. A special stress has been laid on studying the chief breeding media of this species as well as some other common species of *Sarcophaga*.

As far as known it seems that no important account on the life history of *Sarcophaga falculata* Pand. has been given by previous workers. The early stages of other species of *Sarcophaga* have been described in the works of Knipling and Edwards (1936), Smith (1933), Patton and Evans (1929), Greene (1925), Root (1923), Banks (1912), etc..

The writer is greatly indebted to Prof. H. C. Efflatoun Bey under whose supervision this work has been carried out. Thanks are due to Prof. Kamel Mansour for valuable advice and encouragement. I am also very grateful to Dr. H. Salem for his precious suggestions and for the identification of the different species of *Sarcophaga*.

II. MATERIAL AND TECHNIQUE

The breeding was carried out in the laboratory. Some pieces of decaying flesh were placed into a large glass vessel and left in the open, a few drops of water being added from time to time to prevent the flesh from drying. After two days, the vessel was taken to the laboratory and covered with muslin. Within a few days, the early stages were completed and adults emerged.

To study the male terminalia dry *Sarcophaga* flies were relaxed by placing them for about four hours in a glass chamber together with a small piece of cotton containing a drop of glacial acetic acid and kept away from the specimens. The terminalia were then extracted and cut off at their junction with the apparent fourth abdominal segment. This was followed by transferring the terminalia to a solution of 10% caustic potash in which they were left for about 24 hours. The material was then washed several times with water, dehydrated and examined in clove oil placed in a watch glass.

As regards the female terminalia or larvipositor, it was found necessary to remove the abdomen and place it in a 10% caustic potash solution for about 24 hours. When the material was soft, the terminalia were extruded by compressing the abdomen and while still in the potash the apparent anterior four abdominal segments were removed. Particular care was taken to avoid the damage of the fifth sternum when detaching it from the fourth. The fifth tergum was also dissected away from the sixth. After being washed several times with water and dehydrated it was finally transferred to clove oil in a watch glass without cover to avoid any pressure. In some cases, however, it was mounted in thick Canada balsam with the ventral surface uppermost and carefully orientated until it was in a such a position that the sterna and other parts were clearly visible and all on a level.

All the drawings of the male and female terminalia illustrated in this paper were made from specimens treated by the above mentioned methods which were found to be very convenient and accurate.

The larvae were studied from microscopical preparations. The first stage larvae were mounted in Faure's fluid, while the second and third stage larvae were killed in hot water, transferred to a 5% caustic potash solution and left over night. Then they were washed with water, dehydrated and mounted in Canada balsam. The last abdominal segment was studied separately by cutting it with a razor from the rest of the larva and then clearing, dehydrating and mounting it in a hollow slide with its posterior surface uppermost.

III. MORPHOLOGY OF THE ADULT

1. Head Capsule

The head capsule (Plate I, fig. 1) is broad and nearly trapezoidal in shape in the female, and narrow and roughly triangular in the male. Its anterior surface is strongly convex while the posterior is almost flat and slightly conical. In the male the whole head is smaller than in the female and the compound eyes are more obliquely placed. In the posterior surface of the head capsule, and occupying a median slightly ventral position, is the occipital foramen. This is surrounded by the occipital ring, the lateral parts of which are concave externally and convex internally. From the upper and inner margin of these lateral parts two short chitinous bars are given off. These bend inwards and approach each other internally forming the jugum which thus apparently divides the occipital foramen into an upper and a lower opening, but it really lies in a plane a little anterior to the foramen. The jugum helps in supporting the tentorial membrane. On each side of the occipital ring below the jugum there is a small fossa into which a corresponding process from the prothorax fits, forming a support for the head. Posterior to the occipital ring and close to the aperture from which the proboscis depends is the gulo-mental plate which may be regarded as a part of the base of the proboscis. The occipital ring is surrounded laterally by the genae and dorsally by the epicranium. The genae bear the large compound eyes which occupy nearly the whole of the antero-lateral region of the head. On the posterior surface of the head the genae are flat, as they extend from the gulo-mental plate to the epicranium they become distinctly convex. The lower portion of the genae (or the jowls) are provided with numerous genal bristles on the surface. The para-frontals (geno-vertical plates) or the upward continuation of the genae along the inner border of the eyes are yellowish in colour and each is 3/5 to 4/5 of the width of the frontal stripe.

The epicranium on the posterior surface of the head is flat. On the anterior surface it is convex and comprises a number of regions. The area between the large compound eyes of the top of the head and limited below by the ptilinal suture just above the bases of the antennae is the vertex. This contains the three ocelli situated on a slightly raised ocellar triangle which is surrounded by a second triangle — the vertical triangle. In the ocellar triangle there are the divergent ocellar bristles of which one pair situated near the base of the triangle is thicker and longer than the others. On each side of the vertex near the ocular margin and in front of the ocelli and descending to the bases of the antenna there are the frontal bristles which are here decussate and diverging. Lying on each side between the frontal bristles and the ocular margin posteriorly is a stout fronto-orbital bristle. The vertical bristles are composed of a particularly large pair on each side,

situated close to and rather behind the upper inner corner of the eye. Just behind the ocelli there are the post-vertical bristles of different sizes and arranged more or less regularly. Of these, there is one pair which is stout and long. Nearly parallel with the posterior margin of the eye is a row of short and thick black post-orbital bristles, the other hairs on the occipit being white in colour. The part of the vertex between the two rows of the frontal bristles is the frontal (vertical) stripe which is black in colour, and wider in the female than in the male. The median region anterior to and below the vertex is the front which is enclosed by the frontat suture. The front is a depressed plate in the hollow of which the pendulous third antennal segments lies.

The antenna (Plate I, fig. 2) consists of three segments and the arista. The first segment is short and is bordered by slender bristles anteriorly. The second is longer and nearly half the third and bears a long stout macrochaeta as well as numerous short and thick bristles on the outer aspect. This segment is cleft on the outer surface and is attached to the third segment by a small conical peg, which fits into a socket, the two surfaces being kept in apposition by ridges and grooves in order to prevent movement and thus to protect the large antennal nerve. The third segment is much larger and provided with numerous scattered round sensoria on the inner aspect. The fourth, fifth and sixth segments are collectively known as the arista and are attached to the third segment slightly on the outer side near the base. The sixth segment, which is very long, is wide basally, narrows apically and bears a number of long spinulae only on its upper and lower sides for a little more than half its length, the distal portion being bare. The spinulae on the lower surface do not extend as far back as do those on the upper surface.

Anterior to and below the front is a narrow strip bounding the anterior edge of the proboscis aperture and is known as the epistome. This may be regarded as the lower edge of the front. At the sides of the front, in the region just behind the epistome, the frontal pit is located, this margin bearing a row of strong macrochaetae, one of which is more strongly developed than the others, and is known as the vibrissa which lies close to the sides of the epistome. Above the vibrissa and extending to about the middle of the third antennal segment is a number (about 14) of small bristles known as the facial bristles. The epistome is followed anteriorly by the clypeus which is a depressed, chitinous and nearly semi-lunar plate lying in the membrane of the rostrum. Lying transversely above the bases of the antennae and extending downwards on each side of them is the ptilinum the presence of which is indicated externally by the ptilinal suture. Above the bases of the antenna there is a crescentic opening or lunule which marks the invagination of the ptilinum.

2. Proboscis

The proboscis (Plate I, figs 3-9) consists of three main parts : the rostrum, haustellum and labella from above downwards.

The proximal part or rostrum is the largest and is shaped nearly like a truncated cone. It is surrounded by a tough membranous wall which is attached above to the ventral surface of the head capsule, i.e. to the edges of the proboscis aperture, and below being continuous with the walls of the haustellum. The membranous wall of the rostrum is all covered with very minute black bristles which are irregularly scattered. It encloses a large dark brown chitinous plate or the fulcrum which is very similar to the pharyngeal sclerite of the fully mature larva. This plate has nearly the same shape as that of the surrounding membrane of the rostrum. The side walls are somewhat triangular in outline and produced at their upper end into two long and slender cornua or prolongations which are bright yellow in colour and with rounded tips. The side walls or the lateral plates of the rostrum are connected posteriorly and at a short distance from the tips of the cornua by a strong semi-membranous plate which forms the posterior wall of the pharynx. Anteriorly, the side walls are deeply incurved and connected together by a chitinous arched plate or the clypeus which is nearly inverted U-shaped and dark brown in colour. The anterior and lower wall of the pharynx is formed by a thinner granular plate which extends downwards and thus the walls of the pharynx become continuous with those of the pre- and mid-pharynx, the upper end of walls of the pharynx are continuous with those of the œsophagus. The space between the walls of the fulcrum is occupied by the dilator pharyngeal muscles which draw the front wall from the hind and thus the fluid food is sucked up into the pharynx. The maxillary palps are connected to the membrane at the anterior lower surface of the rostrum. They are nearly cylindrical in shape with rounded tips and their distal two thirds are provided with strong short and long bristles. Just below the pharynx at the posterior lower ends of the fulcrum is the pre- and mid-pharynx which form a small chamber closed posteriorly by a rectangular semi-membranous plate. The side walls of the chamber consist for the most part of two nearly brown triangular plates of chitin the apices of which are directed anteriorly. This chamber is in communication distally with the food channel that lies between the labrum-epipharynx and hypopharynx ; its posterior wall is connected to the hypopharynx by means of a membrane, and the anterior wall is similarly connected to the epipharynx The proximal end of the chamber is also continuous above with the pharynx to which it is connected by a membrane.

The haustellum is the intermediate portion of the proboscis. It comprises the labium, hypopharynx and labrum-epipharynx. The labium is the posterior part of the haustellum ; it is shaped more or less like a truncated cone with

its apex distal, and is richly provided with long and short bristles especially near the apex. Its posterior and lateral sides are formed by a strong dark brown chitinous plate which is markedly concave in front and is known as the theca or mentum. The anterior wall is formed by a thin semi-membranous plate which is strongly depressed below the surface and thus forms the so-called labial groove in which the labrum-epipharynx and hypopharynx are situated. This groove is bounded on each side by a strong elongate chitinous rod which serves as a support and helps in the articulation of the labium with the labella. At the distal end of the labium where it divides into the labella there is the so called labial salivary gland composed of a nearly rounded mass of cells. Anterior to the labium and fused with its anterior surface proximally is the hypopharynx. This is flat, tongue-shaped, brown in colour and more slender and darker than the labrum-epipharynx. It is produced on the side a little forwards to afford better apposition with the epipharynx. It is also pierced in the middle throughout its length by the narrow salivary duct. Posteriorly, the hypopharynx extends upwards into the rostrum more than the labrum-epipharynx and is connected to the posterior wall of the pre-pharynx by a membrane. In front of the hypopharynx is the larger labrum-epipharynx. This is elongate, nearly triangular in shape when seen from the anterior side. Its apex is distal and somewhat rounded. The labrum is anterior to and partly encloses the epipharynx. The former is much larger than the latter and constitutes the anterior and lateral walls of the compound organ. The anterior surface is slightly convex, and the lateral surfaces bend posteriorly and are attached to the sides of the epipharynx by a membrane. The ephipharynx is in the form of a deep groove shaped like an inverted U on the ventral or posterior wall of the labrum-epipharynx. At the proximal end it projects a little into the rostrum and is connected to the anterior wall of the prepharynx. The labrum is also connected at this end to the anterior wall of the rostrum. At the distal end the labrum-epipharynx is slightly flattened, tongue-like, and provided on its ventral surface with several sensory papillae. Lying in the rostrum at the sides is a pair of well chitinized dark brown curved rods (the stipes of some authors). They articulate at their lower end with small depressions at the sides of the proximal broad portion of the labrum. The upper end of each rod is broadened, flattened and semi-lunar in shape.

The labium is distally divided into two oral lobes or labella which form the distal part of the proboscis. At rest each lobe is roughly triangular in outline, but under pressure it becomes nearly oval in shape. Both lobes are markedly separated from each other by a deep and wide longitudinal space which is continuous anteriorly with the labial groove. The outer wall of each lobe is connected proximally to the outer wall of the labium. It is provided with a fringe of well developed long setae as well as numerous

bristles and hairs, some of which are of a sensory nature. The inner walls are slightly larger than the outer and during the process of feeding they become widely apart from each other. The inner wall of each lobe is composed of a thin membrane continuous distally with the outer wall of the labellum. This membrane is traversed by thirty two channels or the so called pseudo-trachea which extend from the periphery to the prestomum or the distal opening of the food channel. Those of the middle which number about eleven are distinctly longer than the upper or lower ones. They also open directly into the prestomum while the others above and below unite to form a collecting channel which opens at the prestomum. The cavity of each channel, which is in fact a depression in the membrane of the innner wall of the labellum, is kept open by means of small incomplete chitinous rings which are transversely arranged and give the pseudo-trachea their annular appearance. Each of these incomplete rings is bifid at one end and simply expanded at the other, and they are arranged close together side by side in such a way that the bifid ends alternate with the simply expanded ends. The membrane is closely attached to all parts of the ring. As a result of this arrangement there are two openings into the channel : an irregular narrow opening or groove running along the whole length of the channel, and a shallow groove perpendicular to the channel and lying between the bifid ends of the chitinous ring. These grooves, the interbifid grooves, are the real openings into the channel and their size limits the size of any particle which the fly can ingest. In *Sarcophaga carnaria* the diameter of the pseudo-trachea according to Graham Smith is 0.02 mm. at the proximal end and 0.01 mm. at the distatl end

The prestomal sclerite is a small slightly curved sclerite forming the boundary of the prestomum and serves for the attachment of the pseudotracheal membrane and prestomal teeth. Attached to the prestomal (discal) sclerite are the bases of about 9 prestomal teeth on each side. Each tooth is a thin flattened, elongate, piece of chitin which is produced apically into a number of sharply pointed processes. Very near to the prestomal teeth open the collecting channels each by a separate spout-like opening in which the chitinous rings are greatly expanded. The prestomal sclerite serves also to articulate the labella with the chitinous rods which form the antero-lateral boundary of the labial groove. Posteriorly, the labella articulate with the lower or distal end of the mentum by means of the furca or labellar sclerite which is nearly horse-shoe shaped with the limbs less chitinized than the middle part which is almost straight and very thick. This latter part is produced in the middle into a flattened triangular process pointing downwards.

3. Thorax

The general shape of the thorax as seen from the dorsal surface is nearly oval with the anterior end broader than the posterior one. The colour is

yellowish-grey with three dark stripes: one median continued to the tip of the scutellum, and two dorso-central.

The prothorax is much reduced and pressed forwards and downwards by the large mesonotum. It is best seen after the removal of the head. Its dorsal region or the pronotum is composed of two united sclerites with their dorsal sides curved. The lateral regions of the pronotum are in contact with the humeral calli and the prothoracic pleura. Each humeral callus is strongly convexed and is situated in the antero-lateral region of the thorax. It is bounded above by the prescutum of the mesothorax, internally and below by the pleuron of the prothorax, and externally by the large episternum of the mesothorax and the anterior thoracic spiracle. The pleura are comparatively large sclerites forming the lateral regions of the prothorax. They overhang the attachments of the anterior coxae.

In the ventral region of the prothorax, the prosternum is quadrilateral in shape and median in position. Its anterior end is rounded and the sides are nearly parallel. It occupies only a small part of the prosternal area and is bounded by the prosternal membrane. Extending from the posterior end of the prosternum and running obliquely to the lower borders of the anterior spiracle is a strong fusiform process on each side. In front of the prosternum there is the small saddle-shaped sclerite or the inter-clavicle which is provided with two remarkable processes in front covered with long sensory bristles. The inter-clavicle lies ventral to the cephalo-thoracic foramen. On each side of this foramen there is a prominent pocket-shaped sclerite or jugulaire having its convex surface external. Lying immediately below each of the jugulaires is the small rod-like sclerite or the clavicle.

The surface of the prothorax is provided with numerous bristles, of which the humerals are stout and long and two on each callus. The post-humeral bristles are one on either side while the propleurals are five of which only two are strongly developed.

M e s o t h o r a x : The notum of the mesothorax occupies the whole of the dorsal area of the thorax and is composed of the usual sclerites: prescutum, scutum and scutellum. The prescutum forms the anterior part of the dorsal region of the thorax, and its anterior portion bends down almost vertically to unite with the pronotum. The prescutum is nearly conical in shape with its apex which is rounded, proximal. It is separated from the scutum by the complete "mesonotal" suture, and is bounded laterally by the humeral callus and a membranous strip — the dorso-pleural membrane. The scutum is slightly larger than the prescutum and nearly trapezoidal in shape with its anterior and posterior margins parallel, the sides being distinctly convex. It is bounded laterally by the alar membrane and the lateral plate of the postnotum, and posteriorly by the scutellum. The postero-dorsal angle of the scutum is produced into a prominent process — the post-alar callus. The pre-alar callus is

another smaller process situated just above the root of the wing immediately behind the ends of the "mesonotal" suture. The scutellum is the smallest of the three sclerites, about half the size of the prescutum and is nearly triangular in outline. It is separated from the scutum in front by a well marked transverse incision — the transverse or "meso-scutellar" suture. It also overhangs the post-notum (post-scutellum) which chiefly forms the posterior surface of the thorax. The post-notum is composed of three pieces : a large median plate which is nearly rectangular in outline and strongly convex externally, and two lateral plates which are slightly convex and bounded below by the metasternum and spiracles and anteriorly by the pleural region of the mesothorax. The mesosternum is fused with a part of the episternum to form the sternopleuron which is marked in the mid ventral line by a strong suture. Ventrally it is bounded in front by the foramina of the anterior coxae, behind by the foramina of the intermediate coxae and laterally by the large mesopleuron. This forms the whole of the anterior portion of the pleural region. It is quadrilateral in shape and is raised, above and behind, from the surface of the thorax by its deep inflected margins. It is bounded in front by the humeral callus, spiracle and prothoracic pleuron, above by the dorsopleural membrane, and behind by the mesopleural suture. The epimeron consists of pteropleuron, hypopleuron and metapleuron. The pteropleuron lies behind the mesopleural suture and below the alar membrane. It is nearly rectangular in shape and it is bounded below and behind by the large hypopleuron. The dorsal side of the pteropleuron is closely connected with sclerites of the anterior portion of the wing base. Its surface is also marked by two slight convexities. The hypopleuron is larger than the pteropleuron and subquadrate in shape and is bounded below by the hind coxa, in front by the sternopleuron and behind by the posterior thoracic spiracle.

The metapleuron is small and more or less fan-shaped. It is bounded anteriorly by the mesopleuron, posteriorly by the lateral plate of the postscutellum, above by the wing base, below by the posterior thoracic spiracle. The parapteron is a small irregular sclerite situated at the top of the mesopleural suture, and its greater part is internal, only a small triangular portion is visible externally. The costa is a small thin shell-like sclerite situated on the dorsal margin of the epimeron. Its outer surface is convex and directed downwards and outwards and is covered with fine bristles.

The surface of the mesothorarx is provided with several and various bristles. The bristles, which are important in the identification of this species, are the acrostichals which are absent in front of the mesonotal suture and one pair behind it, and the dorso-centrals which are four or five pairs behind the suture, of which the posterior pair is prominent and the rest quite weak. The scutellar apicals are present. Other than these are the sterno-pleural bristles which are three in number : two anterior and one posterior, the most anterior

and posterior ones being much longer and thicker than the middle one. Male scutellum provided with two very long marginal bristles on each side and a pair of smaller crossed apical bristles. In the female the latter bristles are always wanting. A pair of pre-apical scutellars is also present in the males and females. The hypopleural bristles are seven in number and are of moderate length.

In the metatnorax, the sternum is also fused with the episternum to form a sternopleuron which is smaller, triangular in shape with its apex dorsal. It articulates in front with the hypopleuron, below with the posterior coxa, and behind with the metathoracic epimeron. This latter is smaller than the sternopleuron and rod-like. It is bounded below by the coxal foramen and behind by the first abdominal segment, its dorsal part coming into contact with the base of the haltere. The metanotum is quite indistinct.

4. Wings

The wings (Plate II, fig. 10) are situated at the sides of the mesonotum and are hinged to processes of the latter by means of the small chitinous axillary sclerites. They are covered with very minute hairs. The anterior margin of the wing is formed by a stout vein, the costa which is provided for most of its length with very short black bristles directed towards the apex of the wing. The second vein or the sub-costa lies behind the costa and joins it at about the end of the proximal third of its length. A small vein — the humeral cross vein — extends between the costa and sub-costa near the base of the wing. Tillyards considers it a veinlet and not a true cross vein. The third main vein or the radius divides into a simple anterior branch R1 which joins the costa about half way along its length, and a primary branch — the radial sector — which apparently gives off two branches namely R2+3 and R4+5. The former represents the coalesced second and third branches, and joins the costa at the apical curve, the latter represents the coalesced fourth and fifth branches and joins the costa shortly before its end. This vein bears anteriorly, shortly before it joins the radio-medial cross-vein about 8 short bristles. The fourth main vein or the media divides into M1+2 which represent the fused first and second branches, and M3+4 which represent the fused third and fourth branches. The M1+2 extends across the middle of the wing and bends forwards with sharp angle, joining the costa near the third vein R4+5 and some distance anterior to the apex of the wing. About half way across the wing there is the radio-medial cross-vein joining R4+5 to M1+2 and cuts off the first posterior cell R5 which is narrowly open from the radial cell R. The third and fourth branches of the media (M3+4) together with an intermedial cross-vein have — according to Tillyard — all fused and formed one vein which was referred to — according to the old nomenclature — as the postetrior vein. The fifth vein or cubitus

divides into two branches Cu1 and Cu2; Cu1 is fused with M4 to form the longitudinal vein M4 + Cu1 which runs to the posterior margin of the wing about half way along the length of the latter. The veins M1 + 2 and M4 + Cu1 are joined by the median cubital cross-vein which cuts off the small triangular medial cell M. The last main vein is the analis, its first branch A1 is longer than the second A2 and both do not reach the margin of the wing thus the first cubital and anal cells are incompletely separated from each other. The analis is joined to the cubitus by the cubito-anal cross-vein.

At the posterior border of the wing there is an incision demarcating a small basal lobe — the alula — which is thick and attached posteriorly to the wing root between the mesoscutum and the lateral plates of the post-scutellum. Proximal to the alula, the membrane is again lobed to form the anti-squama and squama which are thinner than the alula and fringed with minute hairs. At the humeral angle there is the small thickened pad or tegula covered with bristles.

The halter is situated on the sides of the thorax attached to the meta-pleuron above the posterior spiracles. Each is an elongated body with a long cylindrical stem, terminating in a globular end and bears few hairs and small bristles. Numerous sensory pits arranged in rows are found on the base.

5. Legs

The legs (Plate II, fig. 11) are uniform in the females but bear distinctive characters in the males. The three pairs of legs are composed of the typical number of segments. Each consists of coxa, trochanter, femur, tibia, and tarsus. The coxae are elongate and more or less conical in shape and richly provided with long setae. The coxae of the first pair of legs are distinctly larger than those of the second and third pair. The trochanter is a small wedge-shaped segment and nearly similar in the three pairs except with a slight and gradual increase in size from the anterior to the posterior pair. The anterior femora are shorter and stouter in the middle than those of the intermediate and posterior pairs of legs. The middle femora in the males only have a very well developed fringe of long soft hairs on the lower edge basally. Also they are provided with a comb of short spines on the ventral side apically. The hind femora also bear a fringe of long soft hairs along its lower edge as well as stiff bristles posteriorly. The anterior tibiae are slightly shorter than those of the succeeding legs. Each tibia is broader distally and nearly as long as the femur and provided with few long setae, and numerous short ones on the sides. On their inner sides the anterior and middle tibiae are covered with short closely-set, black coloured setae. The hind tibia in the male differs from the fore and middle by the possession of a double fringe of long and soft hairs along most of the ventral side. The tarsus is shorter than the tibia and densely clothed with minute setae. It is divided into five sub-

segments, the first being elongate and about half the entire length of the tarsus. The second and fifth tarsal segments are nearly equal in size and distinctly longer than the third or fourth. The general shape of each tarsal segment is nearly conical with the apex proximal and a stout seta at the base on either sides. The fifth or last tarsal segment bears distally the complicated apparatus known as the foot (Plate II, fig. 12). The dorsal side of the segment is prolonged to form a small projection against which a pair of well developed, orange coloured, curved and identical claws articulate by a small condyle. On the ventral surface of the foot there is the foot plate which is a strongly developed sclerite and divided into two lateral and one median foot plates. The lateral foot plates are nearly triangular in shape with the apex outwards, and the base interrupted by a groove directed towards the apex of the triangle. The median plate is pentagonal in shape with the sides nearly equal. On the ventral side of the claws, and attached to the membrane at the end of the segment, there are the pulvilli one on each side. The pulvillus is nearly triangular in outline with the base distal, and the tent hairs on its ventral surface are well developed. The empodium which lies between and ventral to the pulvilli is a spine-like structure, slightly longer than the pulvilli, and provided with two short bristles on either side of its thick base.

6. Abdomen

The abdomen is nearly conical in shape with its apex distal. It is much broader in the female than in the male. As seen from the dorsal side, the abdomen appears to consist of four distinct segments. The apparent first tergum is in fact a compound segment consisting of the reduced first tergum and the larger and normal second tergum. That is clearly shown by the presence of the two spiracles which belong to the first and second segments, and the two sterna in the ventral surface of the abdomen. Senior-White (1924) considers that the apparent first abdominal tergum is the fused second and third, the true first segment being partially fused with the thorax. Lundbeck (1927) in his comment on Senior-White's conclusions considers that the second and third segments of Senior-White are no doubt only one segment except just the part with the first spiracle (the second of Senior-White) often lying in a separated plate. The abdominal segments succeeding the fifth are greatly modified in both sexes; in the male they form the male genitalia and in the female the larvipositor which will be described later. The second tergum is nearly rectangular in shape with rounded anterior ends. The maximum width occurs in the third tergum which is rectangular in outline and bears weak central bristles. The fourth tergum (apparent third) is trapezoidal in shape and provided with a pair of well developed median bristles. The fifth tergum is nearly conical in shape with rounded apex which carries several strong and thick bristles. The whole dorsal surface of the abdomen is densely covered with minute bristles.

In the ventral surface of the abdomen there are five distinct sterna which are comparatively much smaller than the terga and form a series of narrow plates lying along the mid-ventral line. The first sternum is a small rectangular plate about one third of the size of the second sternum which is the largest of all. The third and fourth sterna are nearly similar in shape, nearly conical with rounded distal apices, only the third is slightly larger than the fourth. The fifth sternum differs in shape from the previous sterna in being square in outline, and is the smallest segment after the first. All the sternites except the first are provided with about five rather long bristles at their distal ends. The fifth sternite is deeply clefts in male and forming two narrow lamellae. The ventral surface of the lamellae is bare. The five abdominal spiracles have a peculiar arrangement. The first and second are situated near the outer edges of the sterna, while the other three spiracles have migrated from the pleural region to the outer edges of the terga.

The larvipositor (Plate II, fig. 13)

The larvipositor (female terminalia) is very short. It is formed by the modified 6th, 7th, 9th and the remains of the 10th abdominal segments, the eighth segment being absent according to Patton. The sixth tergum is a large undivided plate dark brown in colour and armed with a row of strong and thick setae along its distal margin. The sixth sternum is nearly rectangular in outline with its distal margin slightly concave, and provided on each side with a pair of long setae together with a number of very minute hairs. The seventh sternum is also well developed and has a peculiar shape. Its proximal edge is distinctly convex and fits in the concavity of sternum 6. Its distal edge is markedly concave and bears on each side one or two stout setae. The tergum of this segment is incompletely developed and extends as an arched plate. The ninth sternum is a large membranous area pale yellow in colour and not only projecting beyond the end of sternum 7 but surrounding its sides. Its distal margin is also concave and slightly grooved in the middle thus appearing as bilobed. Each lobe bears a single long hair. The shape and structure of the sterna 6, 7 and 8 is of an important diagnostic value for this species. Terga 9 and 10 are wanting and sternum 10 is a small semi-transparent plate, nearly triangular in shape with its apex distal, and the base slightly convex. The whole surface is covered with very minute hairs and few long ones. Lying between this sternum and sternum 9 is the large crescentic genital opening. On either side of sternum 10 there are the anal cerci each of which is provided with numerous long hairs. The spermathecae are long flask-shaped bodies, the neck is long and appear to consist of several rings forming a channel.

The male terminalia (Plate II, figs 14-15)

The male terminalia has recently received a considerable study by different authors namely Senior-White (1924), Lundbeck (1927), Salem (1935) and Patton and Wainwright (1935 and 1936) owing to their importance in the diagnosis and determination of the species of *Sarcophaga*.

The male genitalia proper hang from the ninth segment which is called by Böttcher (1912) the second genital segment (GS2), and by Patton (1935) the 9th tergosternum. The genital segment GS1 of Böttcher is the 7th tergosternum of Patton. These two segments are hidden from view on the ventral surface of the abdomen at rest. They are markedly grooved beneath to receive the male terminalia. The first genital segment is large and dark brown in colour and provided on its posterior edge with an incomplete row of strong bristles. The second genital segment is much smaller than the first and is shining yellow or orange in colour and more densely covered with hairs. The anal cerci (the forceps or superior claspers of other authors) are a pair of boat-shaped structures hanging from the second genital segment. They are nearly united with each other basally and free apically. They are brown in colour except their outer margin which is distinctly black and densely covered with long hairs. The apical part of the cerci is nearly bare. The posterior margin is curved and is produced into a hump, while the anterior is nearly straight. The apex in one of the cerci is broadly blunt pointed while in the other it is sharply pointed.

The accessory plates are formed by a pair of triangular sclerites lying anterior to the anal cerci, having a dark brown colour somewhat lighter in the middle. The anterior margin of each plate is provided with long soft hairs.

The phallosome (theca, penis or aedeagus of other authors) is a complicated system of structures lying anterior to the accecsory plates. It consists of two portions: a basal portion known as the shaft (haft of Böttcher) and an apical portion termed the end piece. The shaft of the phallosome carries two pairs of appendages: the anterior and posterior parameres (anterior and posterior gonapophyses of Lowne, vorder und hinter kaken of Böttcher, and anterior and posterior claspers of Parker). The anterior parameres are longer and slightly darker in colour than the posterior ones. They are also less pointed apically and they bear very minute hairs at their broad basal part. The posterior parameres are sharply pointed apically and carry short bristles on their slightly curved anterior margin near the apex. In both parameres the shape is claw-like. The end piece of the phallosome has been the subject of study by various authors such as Böttcher Parker, Senior-White, Rohdendorf and Salem and was found to be complicated. It is composed of a large basal membranous part from

which hang several chitinous processes apically. This membranous part is nearly conical in shape with its base distal and is markedly swollen anteriorly and provided with transverse striations. It carries distally and posteriorly a semi-membranous and nearly triangular plate of a brown colour. In front of this plate and arising from the hollow of the end piece is a pair of nearly black or very dark brown processes somewhat globular or slightly oval in shape. They lie close to each other in the median line. Outside each of these is a club-shaped process of a larger size and of a uniform dark brown colour. Anterior to this process is a thin curved plate more or less pointed anteriorly and golden yellow in colour. Above this plate and attached to the swollen part of the large basal plate is another curved process which is broad and nearly triangular in outline. Its colour is dirty brown and membranous apically.

IV. LIFE HISTORY

1. Sex ratio and sexual maturity

It has been found by repeated observatitons that the proportion of sexes differs slightly in the different seasons of the year. In the early summer and autumn when the fly breeds extensively and is seen in large numbers in slaughter houses, wholesale meat shops and on decaying animal matter, etc., the number of females exceeds that of the males. In the laboratory, the fly was bred several times in September and October from decaying flesh (of dead body of a dog). The adults which emerged were counted and the ratio of both sexes was as follows :

FEMALE	MALE	TOTAL
18	8	26
16	11	27
22	9	31
8	9	17

In the early spring (February and March) the number of both sexes is nearly equal and sometimes the males may slightly exceed the females in number.

The period extending from the time when the fly emerges from the puparium until it reaches sexual maturity and becomes able to larviposit was determined by carrying out experiments in the laboratory. In each experiment fully mature larvae were placed in a glass vessel the bottom of which was provided with a layer of sand. The larvae were left to pupate and in a

few days the adults emerged. These were transferred to a large glass vessel covered with muslin at the top and containing a few pieces of decaying flesh. The flies were 57 of which 36 females and 21 males. It was found that about 14 of these became sexually mature and were observed to copulate in about three days, and to larviposit two days after at 28-30° C. Others, numbering about 13, reached maturity in about five days and larviposited three days after at the same temperature. In a few cases the duration may be prolonged to ten days. But it is very likely that under natural conditions the period of sexual maturity may be about three or four days or even shorter.

2. Breeding habits and breeding season

In the course of this work a special stress was laid on studying the breeding media of this species as well as some other species of *Sarcophaga* which are of common occurrence. Therefore several observations in the open and laboratory experiments have been made in order to find out the most favourable breeding media of these flies. The breeding substances that have been investigated are the decaying bodies of dead animals, human excreta and dung of different animals. The results obtained from direct observations clearly demonstrate that *Sarcophaga falculata* Pand. mainly breeds in decaying animal matter. Especially in the country, the corpses of horses, donkeys and dogs, etc., are frequently seen exposed in the open and these serve as a very favourable breeding medium for this species especially they last for a long time before they become completely dry. The dead bodies of smaller animals such as cats, rabbits and birds, etc., usually harbour smaller numbers of larvae, and are in addition not highly favoured by the flies for larviposition, probably due to the fact that they desiccate in a short time under the high temperature conditions in this country. The larvae of this fly, as a rule, do not breed in human excreta and never do so in dung. Only in two cases three larvae were found in human excreta of about two days old. *Sarcophaga hirtipes* Wied. which comes next to *Sarcophaga falculata* Pand. in its distribution and abundance in Egypt, has been found to be the only species among the common Sarcophagid flies which breeds extensively in dung especially that of horse. It happened several times while examining heaps of horse dung that this latter was teeming with larvae of this species. The corpses of dead animals, decaying animal matter, etc., attract the larvipositing females in less abundance as compared with dung. Human excreta is slightly favoured by this species as a breeding medium. *Sarcophaga carnaria* Meigen is slightly less abundant than *Sarcophaga hirtipes* Wied.. It breeds chiefly in rotten flesh of any kind. Human faeces or dung is of no importance as breeding substances. Continuous and repeated search showed the complete absence of the larvae of this species in these substances. *Sarcophaga dux* Thomson is much less abundant than *Sarcophaga carnaria* Meigen.

Its chief breeding medium is the decaying animal matter. Human excreta comes next in its power of attraction for the larvipositing females. These are never attracted to dung of any kind.

In the laboratory, experiments have been carried out in which the flies were given the option of the three breeding substances mentioned above. Six glass vessels, two containing decaying flesh of a dead dog, two containing fresh human faeces and two containing fresh horse dung, were left exposed for larviposition. Favourable conditions of humidity were afforded by adding small quantities of water whenever these substances showed any signs of desiccation. After being exposed for about two days the vessels were taken to the laboratory, each was covered with muslin, and the early stages were left to complete the development. When the adults emerged the Sarcophagid flies were sorted out among the other different flies and identified. It should be mentioned that not in every experiment the four species of *Sarcophaga* were obtained. In some cases I had to repeat the experiments six times until I was able to obtain the four species in the same breeding experiment. The temperature ranged between 26 and 29° C. in March. The results of one of the typical experiments is given in the following Table. They are

Larviposition experiments

SPECIES	*SARCOPHAGA* OBTAINED FROM ROTTEN FLESH		*SARCOPHAGA* OBTAINED FROM HUMAN EXCRETA		*SARCOPHAGA* OBTAINED FROM ANIMAL DUNG	
	Vessel 1	Vessel 2	Vessel 3	Vessel 4	Vessel 5	Vessel 6
falculata Pand.	92	124	14	7	-	—
hirtipes Wied.	65	42	33	11	88	35
carnaria Meig.......	15	54	—	—	—	—
dux Thomson	29	36	18	31	—	—

generally in agreement with those obtained from direct observation, and in addition they emphasize the importance of human excreta as a breeding medium for some species.

As regards the breeding season of *Sarcophaga* it has been found that the breeding activity lasts from March to October but reaches its maximum in the early summer (April and May) and in the autumn (September) when the flies are found in great abundance and breed very extensively in decaying animal matter, etc.. That is evidently due to the favourable temperature in these months of the year which helps in the acceleration of the developmental period. During the summer months (June, July and August), the high temperature renders the breeding activity considerably less In

winter, the flies are not commonly met with and in January they become hardly seen.

3. Larval and pupal stages

The female is viviparous. The embryo develops in the gravid female and is generally deposited within the egg membrane. Just after depositing, the first stage larvae break out and bore into the food material upon which they are deposited. Larvae which are not fully developed will remain within the egg membrane, under favourable conditions, until they are completely developed, otherwise they will easily desiccate and die before they are ready to begin feeding. In several cases the first stage larvae were obtained by squeezing the abdomen of the sexually mature females. The larvae were then kept in water for a few hours until ready for placement on breeding media. The larvae deposited by the females are forced out through the larvipositor with the anterior end foremost. The usual manner of locomotion that follows deposition is with the anterior end forward. The number of larvae deposited by the female ranges between 4 and 8. It was possible to obtain in one of the experiments 57 first stage larvae from 6 gravid females — in other species the number differs considerably (Knipling and Edwards, 1936). The larva, after deposition, disappears in the food material (decaying meat), feeds actively, increases in size, and in about 24 hours moults into the second larval stage at a temperature of 30° C. At 25 ° C. the duration of the first larval stage lasted 30 hours and when the temperature was lowered to 20-23° C. (mainly 21° C.) the duration was prolonged to about 48 hours. The second stage larva assumes a more pronounced activity and in about 3 days at 20-23° C undergoes the second larval moult and changes to the third stage larva. At a slightly higher temperature (25° C.) the duration was shortened to about 2 days, and at 30° C. to about 32 hours. The third stage larva is an active feeder and gradually attains a relatively large size. The average duration of this stage is about 5 days at 25° C. Third stage larvae found on 25.IX.1939 pupated on 28.IX.1939 at 31° C. Others found on 3.X.1939 pupated on 7.X.1939 at 29° C. At lower temperature (in December 1939) the flies were bred and about 30 third stage larvae were obtained on the 25.XII.1939. Some of these pupated on 31.XII.1939, others on 1.I.1940, the rest on 2.I.1940 at about 21° C.

When the larva approaches pupation it turns creamy-white in colour and bores into the sand which was placed at the bottom of the breeding vessels. The duration of the pupal stage is considerably long in the cold months of the year — in January it may be as long as 13 days. Larvae pupated on 2.I.1940 gave rise to the adult on 14 and 15.II.1940 at 19° C. At 25° C. the pupal stage lasted 8 days and at 30° C. 6 days.

The total duration of the life history is thus about 15 days at 25° C,

and about 11 days at 30° C. Probably this relatively long life cycle is attributed to the artificial breeding conditions in the laboratory. Under natural conditions here the duration may be considerably shorter.

4. First stage larva

The first stage larva is very small in the beginning but gradually increases in length as shown by the following measurements: 3.1, 3.5, 3.9, 4.3, 5.4, 6.1, 7 mm. in length. In thickness it also varies from 0.3 to 1 mm. The number of the body segments is apparently twelve of which the anterior five segments are nearly conical in shape, the rest being more or less cylindrical with very slight tapering posteriorly. At the line of junction of each segment to the other — or in other words in each inter-segmental region — there is a complete ring of delicate, finely pointed, hair-like black spines which are arranged more or less in several transverse rows. These increase towards the posterior end of the larva.

There are no anterior spiracles. The posterior spiracles are situated in a pit, and each consists of two relatively wide, nearly straight slits close together and directed more or less vertically.

The head is a small conical structure, divided into two cephalic lobes separated from each other by a narrow groove. Each lobe bears dorsally the two segmented antenna or the sensory papilla. The proximal segment is nearly cylindrical and much thicker than the distal which is nearly conical. Anterior to the antenna and shifted slightly to the outer side is the so-called maxillary palp, composed of minute sensory structures arranged close to each other. Ventrally, there is a large nearly circular area traversed by the food channels of which those in the middle are the longest of all. The last abdominal segment is provided with a deep pit which is surrounded by small conical processes or tubercles situated at the margin of the pit. The rest of the surface of the segment is granular and armed with minute spines. The cephalo-pharyngeal skeleton differs greatly from that of the next stages. It is much slender and less chitinised. The mouth hooks are equal in size and sharply pointed. Their tips are curved downwards. The ectostomal sclerites are very small and lying on the outer side of each mouth hook. The hypostomal sclerite is rather large and more or less well chitinized. Dorsal and more anterior to this sclerite is the epistomal sclerite which seem to be composed of two plates and devoid of the two sensory organs found in *Musca* larva. The pharyngeal sclerite is deeply incised at both ends, the antero-dorsal end is jointed to its fellow by the small dorsal arch or dorso-pharyngeal sclerite. The dorsal cornua are longer than the ventral which are not produced into a hump.

5. Second stage larva

The second stage larva varies from 7 to 12 mm. in length, and 1 to 2.5 mm. in thickness. It generally resembles the first stage larva in shape but exhibits some differences in detail. The spines of the inter-segmental rings are more developed and numerous. The anterior spiracles are present and each consist of 11 to 12 short digitate processes. The posterior spiracles (Plate III, fig. 16) are more developed, the peritreme is wide and the two spiracular plates are larger than in the first stage larva. The inner plate is nearly straight and is now directed outwards, while the outer plate is slightly curved and dorso-ventral. The head of this stage is nearly similar to that of the third stage larva. The last abdominal segment is truncated and the pit in which the posterior spiracles lie is deeper and the tubercles surrounding it are larger than in the first stage larva. The cephalo-pharyngeal skeleton bear much resemblance to that of the third stage larva. The mouth hooks or mandibular sclerites are for the most part well chitinised and black in colour, their posterior portions being dark brown. Ectostomal and accessory stomal sclerites are small and weakly chitinised. The hypostomal sclerite is well chitinised and the transverse bar connecting its two lateral portions is thick and black in colour. The epistomal sclerite is slightly chitinised at the edges and devoid of the two sense organs as in the first stage larva. The pharyngeal sclerite is well chitinised except the upper portion of the dorsal cornua. Posteriorly these cornua are deeply incised. The dorsal arch is still weakly chitinised and dark brown in colour. The pharyngeal sclerite in produced anteriorly into a small slender process which extends dorsal and nearly parallel to the hypostomal sclerite.

6. Third stage larva

In the beginning, the third stage larva measures about 12 mm. in length but gradually increases remarkably until it reaches 25 mm. in the fully mature stage. Its thickness reaches 5 mm. or sometimes more. The head (Plate III, figs 17 and 18) is now well developed and the two cephalic lobes are markedly separated by a deep groove. Each bears the two segmented antenna and the so-called maxillary palp which is composed of several sensillae. In addition to these there is on the ventral side of the cephalic lobe an oval disc with minute sensillae. The food channels are well developed and more numerous. The spiniferous rings (Plate III, fig. 19) are broader than in the previous stages, and the spines are arranged alternately in about ten rows. In the living condition they are all black in colour, in prepared slides most of them appear pale yellow. The prothoracic segment is demarcated anteriorly from the head and form a sort of collar into which the head can be retracted. Maximum width of the larva takes place in the eigth body

segment. The last abdominal segment (Plate III, fig. 20) differs in shape and structure from the other segments. It slightly tapers posteriorly and most of its posterior surface is occupied by the deep pit or cavity in which the posterior spiracles lie. The edge of the cavity is produced dorsally into six conical processes arranged symmetrically three on each side, and ventrally into other six similar processes the middle pair of which is the largest. The ventral edge of the segment is produced into two large conical processes one on each side. Numerous delicate spines occur all around the segment. The anterior or prothoracic spiracles (Plate III, fig. 21) are provided with 12 short finger-like processes. The atrium here is divided into two incompletely separated chambers, each with an opening to the trachea. The two posterior spiracles (Plate III, fig. 22) are well developed and are separated from each other by a little less than half the width of one. The peritreme is dark brown in colour and not uniform in thickness. It incompletely surrounds the entire spiracle, and there is no button. The wall of the peritreme projects inwards to form two processes: an inner short process bifid at its tip and an outer and longer sharply pointed process. These processes strengthen the chitin on which the spiracular slits are situated. The position of the three spiracular plates is very characteristic and is valuable in the identification of the species. The inner plate is slightly curved with its convex side inner and its concave side outer. Its upper portion lies between the inner margin of the peritreme and the inner bifid process. It is directed outwards and downwards. The middle spiracular plate is nearly straight and slightly directed outwards. Its upper portion lies between the inner and outer processes of the peritreme. The outer plate is curved with its concave surface to the inside. It is nearly dorso-ventral in position, its lower half being directed to the inner side of the spiracle.

The cephalo-pharyngeal skeleton (Plate III, figs 23 and 24) of the third stage larva is well developed, strongly chitinised and all the sclerites are nearly black in colour. The mouth hooks or mandibular sclerites are identical and bluntly pointed. The posterior part of each hook is considerably thicker than the anterior part and is somewhat irregular in shape. Each hook has a deep base by which it articulates against the distal end of the hypostomal sclerite. The light spots regarded as sense organs on the internal side of each mouth hook and which are present in the larva of *Musca* are absent here. The ectostomal or dentate sclerites are relatively small and each lies on the ventral and lateral side of each hook. It begins dorsal and curves on the sides and becomes ventral. The accessory sclerites which are situated ventral to and near the posterior portions of the mouth hooks are short and thick and bifurked distally. The unpaired median sclerite (prestomal sclerite) present in *Musca* larva is absent here. Behind the mouth hooks is the hypostomal sclerite of which the lateral portions are very thick and with simple edges.

Anterior to the transverse chitinous bar of the hypostomal sclerite is the epistomal sclerite which is well developed and seems to be divided longitudinally into two chitinous semi-circular plates each of which is provided with a large light spot or perforation near the median line. This sclerite is devoid of the two pairs of sense organs present in the larva of *Musca*. The pharyngeal sclerites are for the most part strongly chitinised and each is produced antero-ventrally where it articulates with a kind of ball and socket joint against the hypostomal sclerite. A strong slender chitinous process projects from this end above the hypostomal sclerite. The pharyngeal sclerite is deeply incised posteriorly and less so anteriorly. The dorsal cornua are also deeply incised and much longer than the ventral cornua which are not produced into a hump. The dorsal arch or dorso-pharyngeal sclerite is now well developed and sharply pointed at both ends, and is not perforated. Ventrally the pharyngeal sclerites are continuous with the floor of the pharynx, and just below the posterior end of the ventral cornua are the pharyngeal sense organs.

7. Puparium

The puparium (Plate III, fig. 25) is nearly cylindrical in shape with a tapering hind end and nearly rounded anterior end. Its length varies from 10 to 15 mm., but the average length is usually 13 mm. It is nearly twice as long as broad. The colour of the pupal case immediately after pupation is pale yellowish, then changes to bright orange and gradually darkens until it finally becomes dark reddish-brown or nearly blackish in colour. The anterior spiracles of the larva appear as minute processes situated anteriorly. The posterior spiracles form two flat button-like structures situated at the bottom of a deep groove corresponding to that of the larva in the last body segment. The small fleshy processes of this segment in the larva are very small and contracted. The borders between the segments appear as continuous lines which are more distinct in the middle region of the puparium. Along these lines there are broad transverse bands of minute black spines. Each band lies in an inter-segmental position and appear to be composed of an upper, middle and lower narrower bands. Other than these bands numerous transverse wrinklings are found on the surface.

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Explanation of Plate I

Fig. 1. — Head capsule of male (front view) : a. = antenna ; cl. = clypeus ; e. = compound eye ; ep. = epistome ; f.p. = position of frontal pit ; fr.s. = frontal suture ; f.s. = frontal stripe ; g. = gena ; g.l. = jowl or lower portion of gena ; o.t. = ocellar triangle ; 1 = vertical bristles ; 2 = post-vertical bristles ; 3 = ocellar bristles ; 4 = frontal bristles ; 5 = fronto-orbital bristles ; 6 = post-orbital bristles ; 7 = vibrissae ; 8 = facial bristles. — × 12.5.

Fig. 2. — Left antenna : ar. = arista (4th, 5th and 6th antennal segments) ; p. = peg of second segment ; s. = socket of third segment ; sn. = sensoria ; 1, 2, 3 = first, second and third antennal segments. — × 50.

Fig. 3. — Proboscis (lateral view) : cl. = clypeus ; ep. = epipharynx ; f. = furca ; fu. = fulcrum ; hp. = hypopharynx ; hst. = haustellum ; lb.ep. = labrum-epipharynx ; lbm. = labellum ; mt. = mentum ; mx.p. = maxillary palp ; pdt. = pseudo-trachea ; ph. = pharynx ; prp. = prepharynx ; psm.sc. = prestomal sclerite ; r. = chitinous rod or the so-called stipes ; rs. = rostrum. — × 18.75.

Fig. 4. — Proboscis (front view) : cl. = clypeus ; fu. = fulcrum ; hst. = haustellum ; lb.ep. = labrum-epipharynx ; lbm. = labellum ; mt. = mentum ; mx.p. = maxillary palp ; pdt. = pseudo-trachea ; prp. = prepharynx ; psm. = prestomum ; psm.sc. = prestomal sclerite ; r. = chitinous rod or the so-called stipes ; rs. = rostrum. — × 18.75.

Fig. 5. — Proboscis (anterior view of labella) : c.ch. = collecting channel ; pdt. = pseudo-trachea ; psm. = prestomum ; psm.sc. = prestomal sclerite. — × 25.

Fig. 6. — 5 prestomal teeth of the proboscis : psm. = prestomum ; psm.sc. = prestomal sclerite. — × 55.

Fig. 7. — Surface view of a pseudo-trachea to show the structure and arrangement of chitinous rings : intb.g. = inter-bifid groove. — × 450.

Fig. 8. — A pseudo-tracheal ring to show its simple and bifid ends (very much enlarged).

Fig. 9. — Transverse section in haustellum : ep. = epipharynx ; f.ch. = food channel ; hp. = hypopharynx ; lb. = labrum ; mt. = mentum (theca). — × 125.

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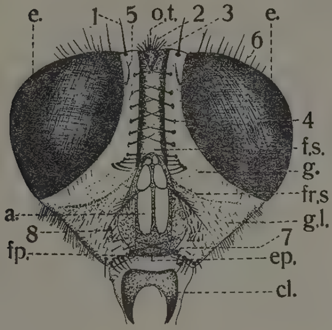
Plate 1



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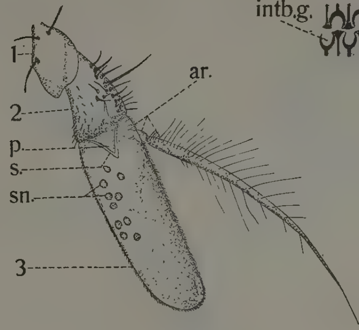

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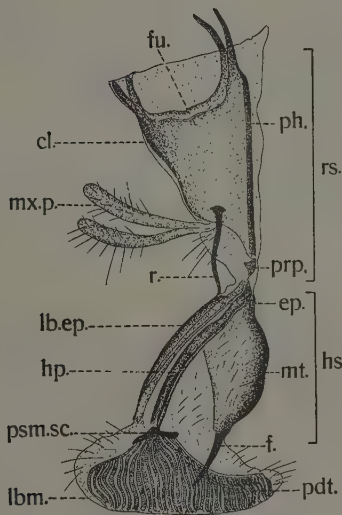

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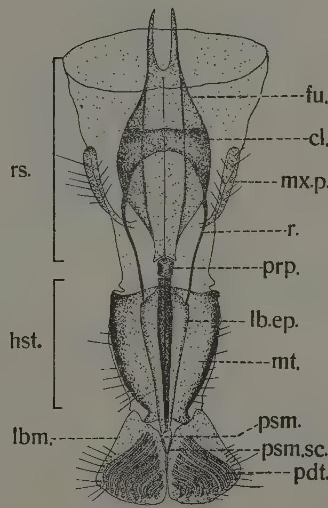

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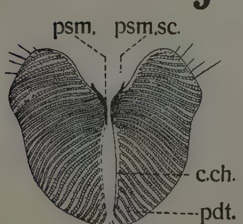

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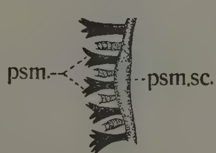

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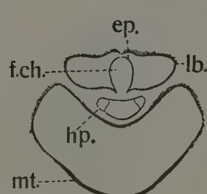

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Morphology and life history
of *Sarcophaga falculata* Pandellé

Explanation of Plate II

Fig. 10. — Right wing: hm. = humeral cross-vein; im. = intermedial cross-vein; rm. = radio-medial cross-vein; tg. = tegula; C. = costa; M. = media; R. = radius; Sc. = sub-costa. — For other letterings see text. — × 7.5.

Fig. 11. — Fore, mid and hind legs of male: cx. = coxa; f. = foot; fm. = femur; tb. = tibia; tr. = trochanter; ts. = tarsus. — × 7.5.

Fig. 12. — Ventral view of foot: cl. = claw; epd. = empodium; l.f.p. = lateral foot plate; m.f.p. = median foot plate; pv. = pulvillus; ts.5. = fifth or last tarsal segment. — × 107.5.

Fig. 13. — Ventral view of female terminalia: a.c. = anal cerci; sp. = spermatheca; st.5 = sternum 5; st.6 = sternum 6; st.7 = sternum 7; st.9 = sternum 9; st.10 = sternum 10; tg.6 = tergum 6; tg.7 = tergum 7. — × 22.5.

Fig. 14. — Lateral view of male terminalia: a.c. = anal cerci; a.p. = accessory plate; an.p. = anterior paramere; g.s.1 = first genital segment (7th tergo-sternum); g.s.2 = second genital segment (9th tergo-sternum); ph. = phallosome; p.p. = posterior paramere; s. = shaft of phallosome. — × 23.75.

Fig. 15. — Front view of phallosome: s. = shaft. — × 37.5.

Fig. 16. — Posterior spiracle of the second stage larva: p. = peritreme; sp.p. = spiracular plate; sp.s. = spiracular slit. — × 87.5.

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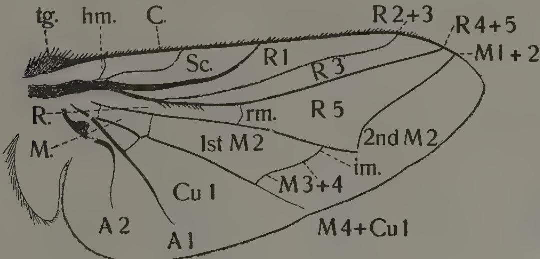
Plate II



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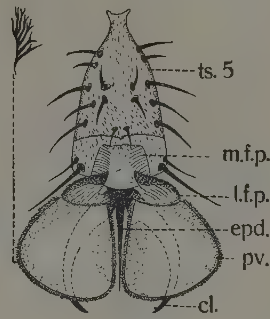

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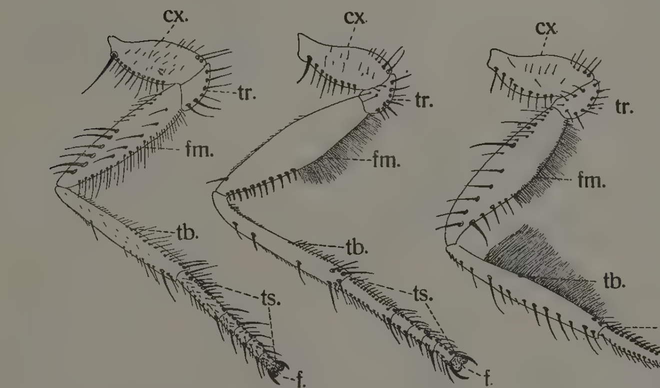

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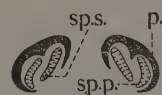

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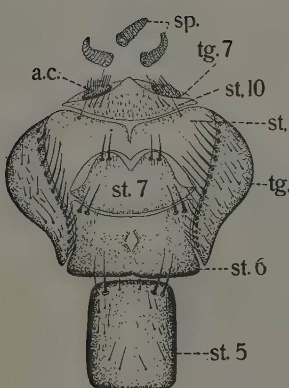

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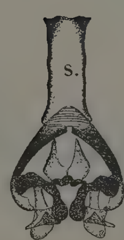

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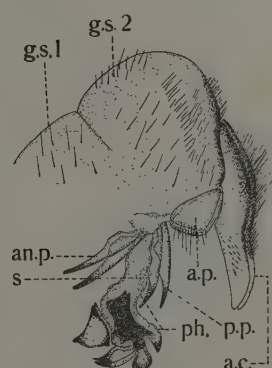

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Morphology and life history
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Explanation of Plate III

Fig. 17. — Ventral view of the head of the third stage larva : c.l. = cephalic lobes ; f.c. = food channels ; m.h. = mouth hook ; mx.p. = maxillary palp ; pr. = prothorax. — × 42.5.

Fig. 18. — Dorsal view of the head of the third stage larva : a. = antenna ; c.l. = cephalic lobes ; mx.p. = maxillary palp ; pr. = prothorax. — × 45.

Fig. 19. — Dorsal view of a spinose ring between the fifth (5) and sixth (6) body segments. — × 13.75.

Fig. 20. — Posterior view of the last abdominal segment of the third stage larva : p. = pit in which the posterior spiracles are situated. — × 11.25.

Fig. 21. — Anterior spiracle of the third stage larva. — × 112.5.

Fig. 22. — Posterior spiracle of the third stage larva : p. = peritreme ; sp.p. = spiracular plate ; sp.s. = spiracular slit. — × 62.5.

Fig. 23. — Lateral view of the cephalo-pharyngeal skeleton of the third stage larva : ac.s. = accessory sclerite ; d.a. = dorsal arch (dorso-pharyngeal sclerite) ; ec. = ectostomal sclerite ; hy. = hypostomal sclerite ; ph. = pharyngeal sclerite ; ph.s. = pharyngeal sense organ ; r.m.h. = right mouth hook. — × 45.

Fig. 24. — Dorsal view of the anterior part of the cephalo-pharyngeal skeleton of the third stage larva : ac.s = accessory sclerite ; ec. = ectostomal sclerite ; ep. = epistomal sclerite ; hy. = hypostomal sclerite ; l.m.h. = left mouth hook ; r.m.h. = right mouth hook. — × 47.5.

Fig. 25. — Puparium. — × 3.75.

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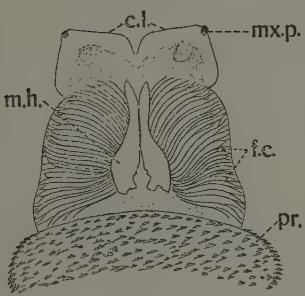
Plate III



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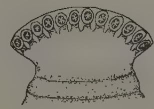

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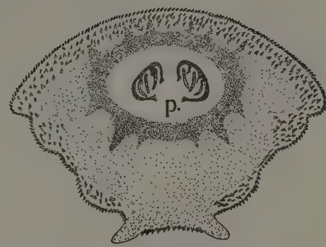

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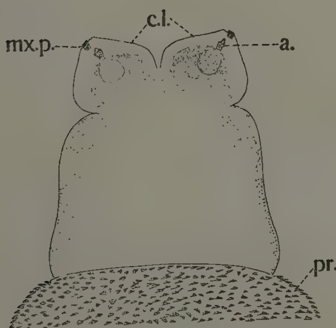

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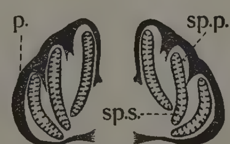

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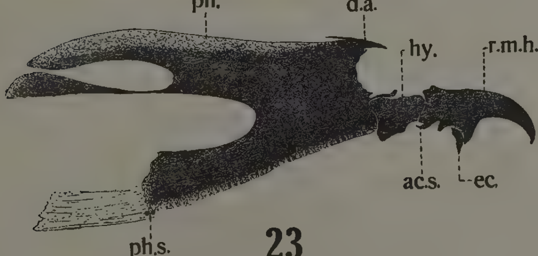

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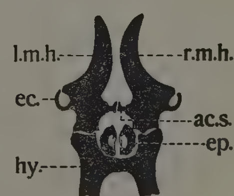

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Morphology and life history
of *Sarcophaga falculata* Pandellé

Studies in the biology of *Microbracon hebetor* Say

[Hymenoptera : Braconidae]

(with Tables I-XVI and 2 Illustrations)

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CONTENTS

I. ACKNOWLEDGMENT

Most of this work has been carried out at the Zoological Laboratories (Cambridge). I desire to express my obligations to both Dr. A. D. Imms, F.R.S., and Professor L. E. S. Eastham for the keen interest they took in my research.

My best thanks are due to Professor J. W. Munro and the staff of the Entomological Department in the Imperial College of Science and Technology for their generosity in providing me with nuclei to my cultures of *Ephestia* and *Plodia*. My thanks are also due to Professor A. Hase of Berlin for sending me some specimens of *Habrobracon juglandis* Ashm. for comparison ; to Dr H. L. Parker of the European Parasite Laboratory of Hyères (Var, France), for providing me with some specimens of *Microbracon brevicornis* Wesm..

II. TECHNIQUE

Rearing the parasitoid *Microbracon hebetor* Say proved to be easy compared with rearing its hosts *Ephestia*, *Plodia* and *Galleria* on which the parasitoid was kept. This was largely due to the fact that *Ephestia*, *Plodia* and *Galleria* larvae exude a certain amount of humidity from their bodies, and when numerous larvae were kept together, the water-content of the culture rose considerably with the result that moulds developed and the culture was spoilt. This difficulty was got over by keeping the hosts in small numbers, in vials (5½ high and 3 inches in diameter) and by covering these vials with muslin to allow evaporation.

In case of *Ephestia* two mated females were placed in each vial with about 100 grammes of Quaker oats. In *Plodia* culture the food used was 40 grammes of sultanas to each vial containing three mated females. In *Galleria* culture the food was comb wax and the number of mated females to each vial was two. It was found necessary in case of *Ephestia* and *Plodia* to keep the vials in incubators at $24 \pm 1°$ C. *Galleria* culture went well at room temperature.

Rolls of corrugated paper were placed in all vials. When the larvae were fully fed, they readily crawled into those rolls and, thus, larvae and pupae could be used as they were required. This method facilitated handling the hosts and kept the culture in good condition.

III. HISTORICAL

The species was first described in America by Say (1836) under the name *Bracon hebetor*. In Belgium, Wesmeal (1838) described another very similar on the following characters :

1. Female's antenna of 13-15 segments, abdominal dorsum smooth (hosts are caterpillars feeding on stored products, i.e. *Ephestia*, *Plodia*, *Galleria*, etc.) .... *Bracon hebetor* Say

2. Female's antenna of 16-17 segments, abdominal dorsum rough and punctated (hosts not caterpillars of stored products, mostly *Pyrausta nubilalis* Hub. and *Dioryctria abietella* Zinck. .... *Bracon brevicornis* Wesm.

These diagnostic characters were not noticed by entomologists before 1922, with the result that a great deal of confusion occurs in literature referring to the species. Kirby (1884) exhibited at a meeting of the Entomological Society of London a parasite of *Ephestia* from a London wharf and identified it as *Bracon brevicornis* Wesmeal (1). Marshall (1885) appa-

(1) Brischke description (1882) is apparently the true *Bracon brevicornis* and hence not referred to here.

rently did not see Say's description; he describes the species under *Bracon brevicornis* Wesm.; he gives a figure of the fore wing and another of the female's head and thorax. Klein (1887) read a paper entitled "Appearance in London of *Ephestia kühniella* and the remedy provided by Nature" at a meeting of the Middlesex Natural History Society. He refers to the species as an "Ichneumonid" and gives sketches of the male and female, but the two sketches are, indeed, very far from being helpful (2). Billups (1888) bred the species from *Ephestia kühniella* Z. and recorded it as *Bracon brevicornis* Wesm. Ashmead (1888) describes it as a new species, *Bracon juglandis*, mainly because the one male specimen from which he made his description was black and did not agree with Say's details of colouration; the host he mentions is a "Lepidopterous larva infesting old walnut". Von Danysz (1893) mentions that the species is of good economic value against *Ephestia* in mills in France. Johnson (1895) reared it from *Ephestia* and was the first to change the generic name to *Habrobracon*, a step which was afterwards extended to the whole genus by Ashmead (1900). In this and in another paper (1895) Johnson refers to the species as *Habrobracon hebetor* Say. Riley and Howard (1895) report it on *Plodia interpunctella* Hb.. Schmiedeknecht (1896) does not differentiate between the 2 species and mentions that the female antenna varies from 14 to 17 segments, his description comes under *Bracon brevicornis* Wesm. Chittenden (1897) refers to the species as *Bracon* (*Habrobracon*) *hebetor* Say; he gives the first instructive figure for the female and reports it as a parasite of *Galleria mellonella* L. in bee hives, as well as of *Ephestia* in warehouses in America. He points out the difference in the number of antennal segments between *Bracon brevicornis* Wesm. and *Bracon hebetor* Say, but thinks that it is not improbable that they are one and the same species. Johnson (1899) records it from *Ephestia*. Szépligeti (1906) describes the species as *Habrobracon brevicornis* Wesm. Buchwald and Berliner (1910) refer to the species as *Habrobracon hebetor* Say, but they erroneously figure the female with a 21-segmented antenna, however, in their short paper, they discuss the economic value of the insect as a parasite against *Ephestia kühniella* Z. in mills of Germany; and they conclude that the wasp is useful though it cannot completely destroy the pest. Popenoe (1911) mentions the species as *Hadrobracon hebetor* Ashm. parasite on *Plodia interpunctella* Hb.. Doten (1911), under *Microbracon juglandis* Ashm., describes some biology of the species and gives good photographs of the female stinging the host, and feeding at punctures. Froggatt (1912) under *Bracon* (*Hadrobracon*) *hebetor* Say records the species from *Ephestia kühniella* Z. and gives a brief systematic description with a

(2) It is erroneously stated in many papers that Kiekie and not Klein read this paper.

figure of the female. Viereck (1911) describes the insect as a new species (*Habrobracon beneficentior*) and mentions that its affinities are with *Habrobracon brevicornis* Wesm.; he reports it from maize store houses in America, Mozambique and Portuguese East Africa. Berliner (1911) worked out some points in the life history and discovered parthenogenesis in the species. Durrant and Beveridge (1913) reported the species from *Ephestia kühniella* Z. in army biscuits and refer to it as *Bracon brevicornis* Wesm.. Cushman (1914) suggests that *Habrobracon hebetor* Say of all authors must sink in synonomy with *Habrobracon brevicornis* Wesm., while *Habrobracon hebetor* of Say must stand as an unknown species. Parker (1915) writes that *Plodia interpunctella* Hb. in California is frequently attacked by *Habrobracon hebetor* Say, but the infestation is not appreciably affected by the ravages of the wasp. Swezey (1915) describes its occurrence on *Plodia* and *Ephestia* from warehouses in Honolulu and gives the duration of the life cycle. He thinks that the shortness of the life-cycle renders the insect very effective in controlling the flour moth. Roubaud (1917) reports its parasitism on *Ephestia cautella* Walk., in ground nuts in Senegal. Whiting (1918) showed that colour in this species does not yield to selection and suggests that difference in colouration is probably due to some environmental influence; he also describes parthenogenesis. Burkhardt (1919) drew up a list of the natural enemies of *Ephestia kühniella* Z. and mentions both *Habrobracon hebetor* Say and *Bracon brevicornis* Wesm. amongst them. Whiting (1921) studied heredity in the insect, and found that temperature was the factor affecting colour. The same author (1921) describes the way of breeding the insect for genetic work. Still the same author (1922) shortly describes some genetic mosaics and ontogenetic abnormalities in the adult. In all his works Whiting erroneously refers to the species as *Hadrobracon brevicornis* Wesm.. Back (1920) writes that *Habrobracon hebetor* Say exercises a check on the number of *Ephestia kühniella* Z. in flour mills in America and considers it to be only an accessory factor in the control. Waterston (1921) reports it from grain pests. Rao (1922) mentions the species under *Habrobracon kitcheneri* Dudg. and Gough parasitising *Batrachedra amydraula* Meyr. a pest of dates and *Earias insulana* Boisd. in Iraq. Hase's work (1922) stands out as the first serious contribution to the study of the biology of the species, with special reference to biological control. If we exclude Berliner's and Whiting's, all the works before Hase's are either short descriptive notes of pure taxonomic value, or of superficial nature merely reporting the occurrence of the insect. Hase describes the possibilities of breeding the insect on a large scale the whole year round. He concludes that the economic value of the wasp against *Ephestia* in mills is considerable, but that it cannot be recommended as the only means of control, and that if it is properly bred and liberated it can prove a useful auxiliary in retarding the increase

of the meal moth. In this work Hase refers to the insect as *Habrobracon brevicornis* Wesm.. Cushman (1922) cleared up the confusion regarding the identity of *Habrobracon brevicornis* Wesm. and *Habrobracon hebetor* Say. Hase (1923) showed the importance of olfactory sense to *Microbracon* in choosing its host. De Ong (1923) refers to the species as *Habrobracon juglandis* Ashmead, and gives the developmental period of its different stages on *Plodia* larvae at room temperature of 24-30° C. He writes that the parasite is the most abundant and widely distributed of any attacking *Plodia* in California. He succeeded in breeding the insect on *Aplomia gularis* Zeller, a caterpillar which infests peanuts. Schulze (1924) describes the way in which the insect cleans its body and appendages. The same author (1924) describes the way in which the antennae are held in receiving different stimuli. He showed that the antennae of the male, besides being olfactory and tactile, are used as mechanical support to the body. Hase ((1924) describes some experiments on the biology of the male and concludes that for breeding purposes only young males should be used to fertilise the females. He refers to the species as *Habrobracon juglandis* Ashmead a specific name which is still used by all German authors. Musebeck (1925) discusses the synonymy of the species and concludes that references in literature to *Bracon* or *Habrobracon brevicornis* Wesm., *hebetor* Say or *juglandis* Ashm. as parasites of *Ephestia kühniella* Z., *Plodia interpunctella* Hb. or *Galleria mellonella* L. concern this species i.e. *Microbracon hebetor* Say [3]. Whiting (1925) found that abnormal males have a high percentage of sterility and their few daughters are almost completely sterile. The cause of this sterility has not been discovered, but she suggests a defect in the oogenesis or spermatogenesis as being responsible. Zacher (1926) reports the species as a parasite on *Ephestia elutella* Hb. in raw cocoa, chocolate and similar products. Schlottke (1926) under *Habrobracon juglandis* Ashm., investigated the influence of temperature on size and pigmentation. He found that the formation of pigment decreases with the increase of temperature, and that pigment is deposited particularly at muscle origins and insertions. Kühn (1927) investigated the predetermination of pigmentation and its inheritance through genes and plasma.

Johnston (1927) writes that *Microbracon hebetor* Say is sometimes an important parasite of the moth *Corcyra cephalonica* Stt. which is a pest of stored seeds. Fahringer does not clearly differentiate between *Habrobracon brevicornis* Wesm. and *Habrobracon juglandis* Ashm.. Myers (1928) reports it as the most important natural enemy of *Plodia interpunctellla* Hb.. In Australia, Schwell (1928) studied some points in the bionomics

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[3] Viereck (1917) is responsible for changing the generic name into *Microbracon*.

of the species in Australia with special reference to biological control of *Plodia*. Henschen (1928) describes the development of sex glands and the effect of hunger on egg production, he finds that the number of mature eggs in ovules are less in females which were kept hungry for 3 days than in normal females. Myers (1929) describes some of the species' habits. Munro and Thomson (1929) write that *Microbracon hebetor* Say undoubtedly plays a large part in reducing the number of *Ephestia* larvae which are able to complete their life-cycle in warehouses in London, and that the possibility of its use as a biological control against *Ephestia* in warehouses is an unexplored field. Hagan (1929) describes the insect's effectiveness against *Plodia interpunctella* Hb. in fig plantations of Smyrna. Durham (1929) writes that it causes rapid reduction in the number of meal moths breeding in extracted combs of bee hives. Richard and Herford (1930) enumerate the products in which the species is found in London warehouses. Knowlton (1931) in three cases out of eighteen attempts succeeded in breeding the species on the codling moth larva *Carpocapsa pomonella* Lin., and, in one instance, on an "unidentified hymenopterous larva removed from willow twig galls." He gives some short notes of biological interest of the species in Utah, America. Payne (1931) shows the effect of temperature upon the development and length of life of the insect. She refers to the species as *Habrobracon juglandis* Ashmead. Goidanich (1931) mentions the specific characters differentiating *Microbracon hebetor* Say from *Microbracon brevicornis* Wesm. Richards and Thomson (1932) review the nomenclature and synonomy of the species and outline the life-history and distribution.

IV. HABITAT

Microbracon hebetor Say is a member of the stored products [4] fauna. It is always found associated with its Pyralid hosts *Ephestia*, *Plodia*, and *Galleria*, harboured in mills, warehouses, wharves, docks, seed stores and ship stores. In these places comparatively dry plant and animal products such as flour, meals, cereals, seeds, dried fruits and bees' wax are stored in large quantities which serve as an inducing trophic factor in attracting a special biotic complex. The temperature met with in such places sometimes allows many insects to breed almost continuously throughout the year. Although this definite and highly specialised habitat with its dry conditions and indoor light and temperature is generally the typical habitat of the species, there is on record, Musebeck (1925), an instance where it has been collected

[4] For the definition of "Stored Products" see O. W. Richards (1932) on "Insect attacking stored Products", *Science Progress*, No. 103, 475 pp.

from cone-galls of *Salix longifolia*, and from bee hives, Chittenden (1897).

V. FOOD

The species is ectophagous on the late larval instar of the host. Both experiments and field observations showed that the larva is the only stage attacked by the parasite. Imms (1931, p. 274) pointed out that ectoparasites very rarely affect hosts living openly and exposed. Salt (1931) states that the genus *Microbracon* prefers hosts from which it is separated by an inert covering. *Microbracon hebetor* Say is apparently one of the rare instances which, although ectophagic, attacks exposed hosts. In wharves and warehouses the walls and ceilings can be seen covered with exposed hosts which have been attacked by *Microbracon* [5]. In the laboratory the writer introduced the female *Microbracon* in petri-dishes containing *Ephestia* larvae (always more than 30 in number) some of which were naked and some in their cocoons, in all cases the naked hosts were attacked first; in some rare cases those in the cocoons were not attacked. This shows that *Microbracon hebetor* Say prefers exposed hosts to concealed ones.

Food of larva

The larva of *Microbracon hebetor* Say feeds on the fluids, semi-fluids and, to a limited extent, small pieces of the host which the mother stings and consequently paralyses before laying her eggs. In some cases decay of the host sets in before the parasitic larvae pass their feeding period. the parasites then continue their feeding and in most cases complete their life-cycle; Berliner (1911) and Hase (1922) made the same observation. If the decay is very advanced, the parasites fail to complete their transformation. Whether the failure in this case is the result of a pathological effect or is due to deficiency in the composition of the decayed diet, or to both, the writer is not in a position to say. Sometimes the host is attacked by the ascomycetes fungus *Cordyceps militaris*, and even when the attack is very severe, the *Microbracon* larvae continue their feeding and successfully complete their development.

Food of adult female

The adult female, after piercing the host with her stinging apparatus

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[5] It is interesting to note that when the host is stung by *Microbracon* the host applies its crochets to the webbed strata and thus is paralysed and at the same time fixed in its position; this fact explains how hosts cling to walls and ceilings and do not fall after their paralysis.

and thus paralysing it feeds at the punctures on the fluids that come out. The sting only paralyses the host and does not kill it as thought by Munro and Thomson (1929). In one instance the writer kept a paralysed *Plodia* host, at winter room temperature (14° to 17° C.), 65 days before the heart stopped beating. Myers (1929) writes that "in an extreme case the heart of a *Plodia* larva may continue to beat for 23 days"; Hase (1922) records 50 days between parasitism and death for *Ephestia kühniella* Z.. If given a host which has already been stung by another female, the adult female feeds on it; a dead host is also accepted, and usually eggs are laid on such hosts if they are fresh, and not decaying or attacked by bacterial diseases; if they are, the female feeds on them without being affected, but she never lays any eggs on such hosts.

Food of adult male

The food of the adult male is difficult to ascertain. Contrary to Hase's statement, it does not feed on the host, because, having no sting it cannot paralyse a host for itself and, as a series of experiments conducted by the writer showed, it does not feed on hosts paralysed by females.

When given cut pieces of sultanas the males feed on them, also they feed on sugar solution and drops of honey. It appears then that males in places like warehouses and wharves, live on what they can get out of dried fruit, but in places like mills where flour and meal is dry they lead aphitic life.

In the absence of a host, the female's fate in feeding will be exactly that of the male, and in this case of course she cannot lay any eggs. Both sexes can live a long time without any food or water — the male can live from 8 to 16 days, the female from 10 to 25 days.

The interesting point here is that the larval stage takes nitrogenous food during the whole period of its life; the adult female takes nitrogenous food during at least a period of its life, while the adult male does not take any nitrogenous food. This nitrogenous food is derived from the host larva. There is an intimate correlation between the function of the different stages and the food taken by them. The larva is the growing stage of the species, for this reason it needs nitrogenous nutriment during the whole period of its life, the female is the stage in which eggs develop, during the period of development of eggs, the female needs nitrogenous food. In case of the adult male; there is neither growth nor egg development and hence it does not need any nitrogenous nutriment during the whole period of its life.

In the laboratory the writer gave the adults sultanas, currants, bananas, honey and sugar solution and both males and females accepted and lived on these diets. Hase (1922) tried with success marmalade, sweet paste and even chopped meat.

The writer's cultures were bred mainly on *Ephestia kühniella* Z. and *Plodia interpunctella* Hb.

VI. HATCHING

When the embryo is ready to issue from the egg, it can be seen through the transparent chorion lying straight and surrounded by the amniotic fluid. The gut is full of yellow small globules of fat and granular material which are presumably remnants of the yolk. The urate cells can faintly be seen.

The pharynx and œsophagus have well developed muscles by means of which they start a pumping process in the head, which is followed by a peristaltic movement of the gut, and a contraction and expansion movement of the abdomen. The combined action of these processes drives the body fluid powerfully into the head, the fluid, then, returns gently backwards to be again powerfully driven into the head, and the movement continues until hatching, and even for some time afterwards.

The mandibles unceasingly move in jerks backwards and forwards. The embryo swallows the amniotic fluid, and shortly afterwards, it swallows bubbles of air. The intake of fluid and air is effected by the pharyngeo-oeosphageal pumping action. Every time an air bubble is swallowed, there is a corresponding slight depression of the area of the chorion opposite the mouth; this proves that the air swallowed is an outside air. Nuttall (1918) experimentally proved the same phenomenon in *Pediculus humanus* L.. Sikes and Wigglesworth (1931) showed that many insect in the eggs take outside air in the trachea. Thus Heymone's generalisation (1926) that an insect in the egg is never known to take up outside air, either through the mouth or into the trachea, is completely refuted. As a consequence of growth and intake of amniotic fluid and air, the embryo enlarges in size and now fills the whole shell.

The urate cells now show very clearly. The trachea begin to appear, at first full of fluid afterwards of gas; gas appears first in the tracheal trunks and afterwards in the capillaries. Frankenberg (1915) put forward the suggestion that the embryo in the egg is under hydrostatic pressure, and that when this hydrostatic pressure is reduced by hatching, the liquid in the trachea is absorbed by osmosis and secreted gas appears in the trachea. On the other hand Keilin (1924) advances the theory that the tracheal fluid is absorbed by the cells of various tissues from the intra-cellular capillary tracheoles; the column of fluid is thus ruptured, the space left by the retiring fluid being immediately filled by gases diffusing from the surrounding media (blood). Sikes and Wigglesworth (1931) working on different examples, none of which a hymenopterous one, disproved Frankenberg's suggestion. In *Microbracon hebetor* Say the appearance of gas in the whole respiratory system takes place quite a long time before hatching. This shows

that the idea of hydrostatic pressure on the embryo is untenable, confirms Sikes and Wigglesworth's work and extends it to Hymenoptera. Thus the balance of evidence favours Keilin's theory.

The embryo now becomes more active and pushes itself against the walls of the anterior pole of the egg leaving at the posterior end an empty portion which soon collapses. Nuttall (1918) working on *Pediculus humanus* L. attributes the forward pushing of the embryo to the action of air expelled from the anus and accumulating behind the embryo. This phenomenon does not, and cannot, happen in the case of *Microbracon*, because the hind gut at this stage is not connected to the rest of the gut. The forward movement of the embryo here is entirely due to muscular action.

The anterior pole of the egg now enlarges in size due to the sudden enlargement of the head and prothorax of the embryo. The antennae can be seen pushing against the chorion and finally pushed through it and slitting it open. In many cases the antennae re-enter the cut and again are pushed against the chorion at another place and a new slit is made; sometimes the chorion is slit in many places before the larva pushes out its head. It then wriggles out of the chorion leaving behind the embryonic envelopes, and thus hatching is complete. The whole process from the time the embryo starts moving its head until the larva frees itself from the shell takes an average of two and a half to three hours at summer room temperature of 20-22° C. Gas appears in the trachea half an hour before hatching, under the same conditions.

Hase (1922) did not recognize the phenomenon of swallowing amniotic fluid and air. He states that the egg shell is sucked in from the inside with the object of slitting it by means of the needle-shaped mandibles. The present writer cannot confirm this statement. In no case were the mandibles seen slitting the chorion in this insect. In every case the antennae were the organs responsible for piercing the chorion, and, as arleady mentioned, the insucking of the chorion opposite the mouth is correlated with swallowing of air bubbles. The incessant movement of the mandible is probably to help swallowing. In *Microbracon brevicornis* Wesm. though Genieys (1925) does not mention which organ actually slits the chorion, it is clear from his description that the mandibles take no part in the process; he describes the antennae as being the first organs to appear out of the shell though he did not observe that they pierce the chorion.

VII. DURATION OF LIFE IN IMAGO

The duration of *Microbracon hebetor* Say imago has been differently estimated by different authors as shown in Table I.

Unfortunately the conditions under which each worker obtained his results are not described. This inadvertency not only exaggerated the dif-

ference between the results of the authors, but deprived their data of its valuable significance.

TABLE I

Estimation of duration of *Microbracon hebetor* Say imago according to authors

AUTHOR	LONGEVITY OF MALES IN DAYS	LONGEVITY OF FEMALES IN DAYS	CONDITIONS MENTIONED
Berliner (1911) ..	9 (maximum)	30 to 40	—
Doten (1911).....	7	—	70 to 80° F.
Whiting (1918)...	—	42	—
Hase (1922)	24	78	Fully nourished ? Room temperature ?
	21	27	Starved ? Room temperature ?
Schwell (1928)....	—	42	—
Knowlton (1931)..	1 to 18 (average 7.2)	1 to 37 (average 15.2)	—
Payne (1931).. ..	90 and 3		Under 3 and 36° C. consecutive. Sexes not mentioned.

TABLE II

Longevity of females of *Microbracon hebetor* Say emerging during August-September

LONGEVITY IN DAYS	51 to 60	61 to 70	71 to 80	81 to 90
Frequency	5	18	20	10
Room temperature range 13 to 21° C.				Total 53

TABLE III

Longevity of females of *Microbracon hebetor* Say emerging during October-November and passing through Quiescent Period

LONGEVITY IN DAYS	91 to 100	101 to 110	111 to 120	121 to 130	131 to 140	141 to 150	151 to 160	161 to 170	171 to 180	181 to 190	191 to 195
Frequency	4	4	5	6	4	7	10	4	4	3	3
Room temperature range 10 to 18° C.											Total 54

TABLE IV

Longevity of females of *Microbracon hebetor* Say
emerging during May-July

LONGEVITY IN DAYS	21 to 30	31 to 40	41 to 50	51 to 60	61 to 70
Frequency	2	6	16	21	9
Room temperature range 14 to 31° C.					Total 54

Duration of life in female

Tables II, III and IV show in details the duration of life obtained by the writer for the female in different periods of the year, the average of duration is given in Table V. These females were bred on *Ephestia kühniella* Z. larvae at ordinary room temprature (shown under each Table and taken

TABLE V

Average longevity of females of *Microbracon hebetor* Say
in different seasons

TIME OF EMERGENCE	AVERAGE OF LONGEVITY IN DAYS
August to September	71.98
October to November and through Quiescent Period	144.24
May to July	51.80

from a daily chart). Some of the females were mated and some were virgins. The writer did not find any difference in duration of life between mated and virgin females.

It will be noticed that the duration of life in females differs in different seasons; in summer when the activities of the insect and its rate of living is at its height females' lives are short; in autumn they are longer. In winter some of the females which passed through the quiescent period lived 195 days or nearly 28 weeks, a fact to which attention is especially called and which entirely changes our outlook on the longevity of the species.

Duration of life in males

At room temperature (17 to 20° C.), starvation, and ordinary day light, males which mated lived 12-14 days; males which did not mate lived 14

TABLE VI

Frequency of longevity in males and females of *Microbracon hebetor* Say, when starved, fed on water, and on sugar solution.

LONGEVITY IN DAYS			14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	TOTAL
Frequency of longevity	Starved	♀♀	—	—	—	—	—	—	—	—	—	—	—	1	2	6	4	5	6	1	25
		♂♂	—	1	2	6	9	5	2	—	—	—	—	—	—	—	—	—	—	—	25
	On water	♀♀	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		♂♂	—	—	—	—	—	—	—	—	—	3	7	7	8	—	—	—	—	—	25

LONGEVITY IN DAYS			32	33	34	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	TOTAL
Frequency of longevity	On water	♀♀	—	—	—	—	—	—	—	2	4	4	8	5	2	—	—	—	—	—	25
		♂♂	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	On sugar solution	♀♀	—	—	—	—	—	—	—	—	—	—	—	—	4	8	8	3	2	—	25
		♂♂	—	—	—	—	—	—	—	—	4	5	7	6	3	—	—	—	—	—	25

In dark, and room temperature range 15 to 17° C.

Total 150

to 16 days; under constant temperature of 26 ± 0.5° C. starvation and ordinary daylight males which mated lived an average of 8 days, males which did not mate lived 10 days. Number of individuals used in experiment was 50 mated and 50 did not mate in the first case, i.e. room temperature, and 25 mated and 25 did not mate in the constant temperature of 26 ± 0.5° C. and all the males came from a batch bred at room temperature.

Effect of starvation and nourishment on longevity

Duration of life of both sexes differed when the insect was : (1) starved, (2) given tap water, (3) given cane-sugar solution (5 gr. in 100 cc.). The frequency Table VI shows the details of longevity with every treatment, which is summed up in Table VII.

TABLE VII

Average of longevity of *Microbracon hebetor* Say with different treatment

TREATMENT	LONGEVITY IN DAYS	
	♀♀	♂♂
Starved	28.28	17.48
Given water	46.64	24.81
Given 5 % Cane sugar solution	50 64	42.96

It will be noticed that there is a difference in the duration of life between the starved males in this experiment and those in the last one; this is due to the fact that this experiment was carried out in the dark, and at a room temperature of 15-17° C., which is lower than that of the last experiment, both these two factors dark and low temperature, tend to lessen the activities of the insect, and, as shown by Wheeler (1928), Alpatov and Pearl (1929) and Imms (1932), the total duration of life varies inversely as the rate of energy-expenditure.

VIII. PARTHENOGENESIS

The phenomenon of parthenogenesis is of constant occurrence in this species, and fertilisation is neither an absolute condition nor a stimulus for oviposition or development of eggs.

Fertilised females produce males as well as females, while virgin females produce males only; this arrhenotokous type of parthenogenesis is the rule in this insect but Hase (1922), in one instance, got males and females from a virgin female. The present writer also got this deuterotokous partheno-

genesis happening only in one case, and was unsuccessful in his repeated experiments to get it to happen again [6]. There is no question of doubt about the virginity of the female which gave this instance of deuterotoky, the writer got all his virgin females from individuals isolated in the larval stage just when these started spinning their cocoons. Whiting at first did not find this deuterotokous parthenogenesis in this species; in 1918 he wrote "Not a single female has been produced from a virgin female"; again in 1921 he wrote "Parthenogenesis is strictly haploid, thousands of offsprings reared from virgin females include not a single female". But Wheeler (1928, p. 163) wrote that Whiting informed him that he (Whiting) secured few females from unfertilized eggs. There is a similar case recorded in the Tenthredinid *Nematus miliaris* Panz., which is normally arrhenotokous, but in one occasion Fletcher (1880) bred 22 males and one female from a virgin. It is difficult to understand the significance of these isolated instances; in the case of *Microbracon hebetor* Say, probably we are dealing with a species in which a new genetic race is evolving and, at the end, will be established; a case parallel to what we get in the Chalcid *Trichogramma pretiosa* Ril. and the Aleurodid bug *Aleurodes vaporariorum* Westwood, where a thelyotokous race and an arrhenotokous one, are met with (Williams, 1917). In the case of *Microbracon hebetor* Say one race will be arrhenotokous, the other deuterotokous in their parthenogenesis.

It is noteworthy that all types of parthenogenesis occur in the family Braconidae. *Microbracon brevicornis* Wesm. (Genieys, 1925) and *Microbracon hebetor* Say are examples of arrhenotoky; thelyotoky is described in *Pygostolus falcatus* Nees by Jackson (1928) and in *Apanteles thomsoni* Lyle by Vance (1931); deuterotoky is described by Hunter (1909) in *Lysiphlebous tritici* Hunter. Furthermore, in the same genus *Dinocampus* (*Perilitus*), one species (*Dinocampus coccinellae* Schrank) is thelyotokous while another (*Dinocampus rutilus* Nees) is arrhenotokous.

IX. LIFE HISTORY

Although *Microbracon hebetor* Say has been the subject of research for many investigators in different countries, no attempt has been made to work out its complete life-history. Munro and Thomson (1929) wrote "Much work is necessary before definite statement can be made upon the life-cycle and many of the habits of *Microbracon* under British climatic conditions."

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(6) The conditions under which the writer got his instance of deuterotoky were :

(a) The virgin female in question was bred at room temperature 64-70° F.

(b) The virgin female was given her first host when she was 8 days old and no food or water was given to her before her first host. The eggs she laid developed at room temperature of 64-70° F., on one day during their development, the temperature dropped to 58-60° F. and this was during the early pupal period.

Also as far as the present writer is aware the life-history of no member of the whole genus *Microbracon* is at all known. It was, however, for this reason, and hoping that it might throw some light on the value of the insect in the field of biological control, that the present writer investigated the life-history of the species. For the sake of convenience it is described under the following sub-headings: Life-cycle, Seasonal history, Number of generations, and Quiescent period.

Life-cycle

The succession of stages through which the species passes in order to complete its life-cycle is the adult, the egg, four larval instars, prepupa and pupa. The time taken by each stage to complete its development varies during the different months of the year according to temperature. Observations upon insects kept in a tube in ordinary room temperature and fed upon larvae of *Ephestia kühniella* Z. gave the times for the completion of the life-cycle as shown on Table VIII. The periods were calculated from the time the egg was laid to the emergence of the mature insect.

TABLE VIII

Life cycle during different months

MONTH	LIFE CYCLE IN DAYS	REMARKS
May and first week of June	32	Temperature ranged from 60 to 69° F.
June..	18	Temperature mostly above 70 and under 80° F.
July	28	Temperature round 64° F.
August..........	22	Temperature about 70° F (in pupal stage it was 90° F.).

Under controlled temperature the variation was as recorded on Table IX.

TABLE IX

Life cycle under controlled temperature

TEMPERATURE IN °C.	LIFE CYCLE IN DAYS
22	17 to 18
24	14
25	12
26	10
30	9

The time taken for the completion of the various stages of the life-cycle at room temperature in May and first week in June is shown in Table X. The temperature during that period ranged from 60-69° F.

TABLE X

Developmental period of different stages at room temperature

STAGE		TIME IN DAYS
Egg		3
Larva	feeding	7
	spinning and at rest	8
Prepupa		2
Pupa		12
Total		32

The details of the life-cycle under controlled temperature are recorded on Table XI.

TABLE XI

Developmental period of different stages under controlled temperature

STAGE		TIME IN DAYS AT 22° C.	TIME IN DAYS AT 25° C.
Egg		2	1
Larva	feeding	3	3
	spinning and at rest	3	1
Prepupa		2	1
Pupa		8	6
Total		18	12

The length of the life-cycle is not only affected by temperature, but is prolonged when the host of the parasite is in poor condition, or is in its early instars, that is to say when the food supply is not normal.

Seasonal history

Microbracon hebetor Say passes the winter in hibernation. Breeding usually starts towards the end of January and during February. The first

generation appears sometimes as early as the third week in March and sometimes as late as the last week in May, according to the prevailing temperature and to individual variations. The generation that appears the second week of October does not start breeding then, but enters the quiescent period until the next spring when breeding commences. Males do not survive the winter, females generally do. Towards the two ends of the breeding season (October to March), the life of males and females is usually longer than it is in the middle of the season, and the rate of development in the middle of the breeding season is greater than at the two ends.

Individuals of both sexes appearing in warm seasons are testaceous in colour, with some black patterns, whose areas decrease by the increase of temperature; on the other hand, those individuals which appear in cold seasons are almost black in colour with some small yellow patches on legs and palps. This intimate correlation between temperature and colouration suggests the capability of the species of thermal economy — i.e. in winter the black colouration favours the absorption of infra-red heat rays which in warm weather, is not so much needed, and hence the species turns testaceous.

Genieys (1922) showed that temperature was the only factor that produced decolouration in *Microbracon brevicornis* Wesm.. Schlottke (1926) in the case of *Habrobracon juglandis* Ashmead (*Microbracon hebetor* Say) showed that formation of pigment decreases with the increase of temperature; and that pigmentation was deposited particularly at muscle attachments.

Number of generations

The species is multivoltine with 5 to 7 generations and numerous broods every year. The variation in the number of generations is largely due to the temperature prevailing during the breeding season. In Australia, the insect has eight generations (Schwell, 1928).

Quiescent period

Hase (1922) in Germany conjectures that the species hibernates "as pupa and adult." Schwell (1928) in Australia showed that the insect hibernated as female, probably a virgin female. Richards and Thomson (1932) think that in England it hibernates as pupa. The present writer concludes on the following evidence that *Microbracon hebetor* Say hibernates in the state of female, mated as well as virgin. This conclusion was arrived at in two ways:

(1) Collecting in the field and keeping the collected material under observation at room temperature varying from 12-16° C. in winter and from 16-22° C. in autumn and spring.

(2) Breeding in the laboratory for two seasons under the same temperature conditions mentioned above. These conditions do not very much differ from the natural conditions in wharves and warehouses.

In collecting the writer noticed that in winter females were found though not in large numbers, that males were not found at all (in rooms of warehouses where new consignments were stored, some males were found, apparently introduced from abroad — but my collecting was carried on in rooms where no new stuff was stored) and that eggs, larvae, prepupae and pupae were seldom met with. This gave a preliminary suggestion that the species probably hibernated as a female. Individuals of every stage were collected as shown in Table XII and were kept under observation. Males generally died 1 to 8 days after collecting ; eggs, larvae, prepupae and pupae collected in autumn either completed their development or died ; those few collected in winter all died without further development, certain number of the females died and the rest came through the winter and started breeding in spring.

Table XII

Hibernation field collection 1930-1931

STAGE	TIME OF COLLECTING				TOTAL	THOSE WHO PASS WINTER IN SAME STAGE
	September	October	November	December		
Eggs.......... ..	82	77	0	0	159	0
Larvae............	68	54	14	12	148	0
Cocoons........ .	91	84	99	24	298	0
Males	121	69	0	0	180	0
Females	125	411	289	86	911	536

Breeding in the laboratory was started with two aims :

(1) To check the data obtained from field collecting.

(2) If the female is the hibernating stage to ascertain whether she hibernates as a mated or as a virgin female. The result obtained and recorded on Table XIII confirmed those of field experiments that females are the only stage that survive the winter. In the second question breeding showed that females hibernate some as mated and some as virgin females.

This finding is made more intelligible than Schwell's suggestion that the species hibernates as a virgin female when we consider the following facts :

The species is parthenogenetic and parthenogenesis here is of the arrhenotokous type ; now, in spring the first generation of many hibernating females consists of males as well as females ; this cannot happen if the mother is a

virgin female. Furthermore, in order to preserve the species this suggested hibernating virgin has got to be mated sometime, the earliest chance she would get is in the early spring when the first generation of males appears, that is, when she is at least 14 weeks old; at this age the chances of a female accepting a male are very few and if mating occurs then, it is usually unsuccessful and the resulting progeny is all males, and that is detrimental to the species.

TABLE XIII

Results of hibernation breeding experiments

STAGE	SEASON 1930-1931		SEASON 1931-1932	
	NUMBER OF INDIVIDUALS DEALT WITH	NUMBER OF INDIVIDUALS WHO SURVIVED WINTER IN SAME STAGE	NUMBER OF INDIVIDUALS DEALT WITH	NUMBER OF INDIVIDUALS WHO SURVIVED WINTER IN SAME STAGE
Eggs	160	0	725	0
Larvae	132	0	842	0
Prepupae	56	0	318	0
Pupae	42	0	476	0
Males	123	0	650	0
Virgin females	47	40	107	76
Mated females	22	18	84	63

That females do not accept males at "old" age, and that if a male can by force overcome an "old" female and actually succeeds in mating her, this mating fails to fertilise the female, is deduced from the following experiment.

On the fourth of April 1932, each of 10 virgin females, which had emerged during the period 10-19th of November 1931, and which passed the winter in hibernation, was isolated with two young males (2 days old), and kept under observation. All environmental conditions were favourable for mating. The result was, that five females successfully resisted the males and would not be mated. The other five, after long resistance, were overpowered by the males and mated; two of these last five females died before laying any eggs; the remaining three females laid 82 eggs and died, one on the 15th and two on the 16th of April 1932; 36 imagos came out of these 82 eggs, and all of them were males. This shows that the females were not fertilised.

Hibernation in *Microbracon hebetor* Say can be brought to an end if the hibernating female is subjected to favourable temperature conditions. In

nature if a spell of warm weather, i.e. over 17° C., sets in during winter, the hibernating female may lay some eggs, they sometimes sting hosts and feed on them at 15° C.. In the laboratory the insect could be successfully bred the whole year round under favourable temperature conditions (22-30° C.). All this shows that hibernation here is not a state of real dormancy but is only a quiescent state (7).

In warehouses and wharves hibernating females are usually found in dark places, mostly, corners, crannies and crevices in the walls and ceilings, and between the rafters where they lie motionless with their antennae resting backwards on the dorsal side, and the whole ventral surface of the body in contact with the strata, probably to lessen the amount of evaporation. If disturbed during their quiescence they slightly move.

In one instance, November 1931, a female did not emerge from the cocoon when she was fully mature, but hibernated inside the cocoon as a full mature imago and emerged in February 1932.

X. OVIPOSITION

Egg-laying does not start until the host is completely paralysed. A constant temperature stimulates oviposition more than a varying one. Usually *Microbracon hebetor* Say attacks its host when the latter is in its late instars and in a healthy condition. The last instar is preferred.

Much patience is required if one wishes to see *Microbracon hebetor* Say in the act of ovipositing. She takes quite a long time, sometimes as long as three hours, inspecting the paralysed caterpillar and its surroundings, using the tip of the ovipositor as a feeler. When the female starts egg-laying she gets a good hold and then curves the much dilated abdomen under her. The ovipositor is extended to its full length being held between, and guided by, the ovipositor palpi. Apparently great effort and exertion is needed in extruding the comparatively big egg. The egg appears at the middle part of the ovipositor and slowly slides down between the sheath until it is gently laid on the substratum. The female is not very easily disturbed during oviposition. After a certain number of eggs has been laid — the number differing according to conditions — the female stops laying until she is supplied with another host. Eggs are never laid haphazardly.

Usually the eggs are laid on the substratum either under the victim's body or at the sides; on some occasions they are laid on the body itself,

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(7) Shelford (1929, p. 150) suggested that the two synonymous terms "Dormancy" and "Diapause" should be restricted to cases in which activity or development is spontaneously arrested. The cases in which activity or development is interrupted by the direct influence of unfavourable conditions and is resumed as soon as the conditions become favourable are referred to as quiescent stages and do not come under head of dormancy or diapause.

and in this case they may sometimes be seen leaning against one of the spines of the host. Eggs are laid singly or in clusters of 2 to 7 and never far from the the host (see Fig. 1).

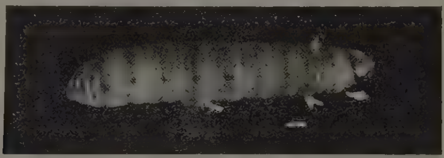

Fig. 1. — Position of the eggs of *Microbracon hebetor* Say laid on *Ephestia* caterpillar.

XI. PERIOD OF OVIPOSITION

The female is ready to oviposit 14 to 48 hours after emerging from the cocoon, and under favourable conditions goes on laying during the whole period of her life, stopping 1 to 2 days before death.

XII. TOTAL NUMBER OF EGGS LAID BY A SINGLE FEMALE UNDER ROOM-TEMPERATURE

The writer did not find any significant difference in the number of eggs laid by virgin and mated females.

Three females bred by Hase (1922) laid 317, 257 and 201 eggs consecutively, with an average of 258.3 eggs for a single female; 34 females (8) bred by the present writer on *Ephestia kühniella* Z. at room temperature of 17-28° C. laid an average of 187.44 eggs; the lowest number of eggs laid being 76 eggs, and the highest 362 eggs. The detailed data are given in Table XV.

XIII. INFLUENCE OF TEMPERATURE ON OVIPOSITION

The temperature at which females are kept, markedly influences oviposition. Under the temperature of 15° C. and over 41° C. no eggs are laid. Hase's figure for the lower limit of oviposition is also 15° C., but he did not work out the upper limit. The following experiment illustrates the effect of temperature on oviposition.

Five batches of 10 females each, were kept at different temperatures for four days, each female being supplied with a fresh full grown larva of *Ephestia kühniella* Z. every 24 hours. The eggs laid on the first day were not counted. Table XIV shows the number laid by each batch of ten females.

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(8) All these 34 females lived until they died of old age; all females which died through accidents, etc., were eliminated.

TABLE XIV

Number of eggs laid by 5 batches of 10 females
in three days at different temperatures

TEMPERATURE IN °C.	NUMBER OF EGGS
18 ± 1	381
22 ± 1	435
26 ± 0 5	560
30 ± 0.5	636
34 ± 0.5	683

It must not be inferred from this that the total number of eggs laid by a female would necessarily increase by increasing the temperature, because high temperature shortens the life of the insect; it is merely a case of accelerating the rate of oviposition.

XIV. STERILE EGGS

It is the experience amongst some entomologists to judge the fecundity of a species by the number of eggs laid by the female. In *Microbracon hebetor* Say this principle would be extremely misleading, because an average percentage of 39.54 % of the eggs laid do not develop (9); soon after oviposition these eggs shrivel up without showing any signs of embryonic development. Of the previous workers, the only one who described this phenomenon in the species is Hase (1922), whose finding the writer confirms and extends. Berliner (1911), Whiting (1918 and 1921), Schwell (1928) and Myers (1929) all made no mention of sterile eggs in their papers.

These sterile eggs are laid haphazardly amongst the normal eggs and at first one cannot differentiate between them until the normal eggs begin to develop and sterile can be detected by their opaque appearance and by the fact that they soon shrivel; they are laid by virgins as well as by mated females, and independent of age and season.

Sterile eggs seem to be of common occurrence among many insects and though the phenomenon is of important economic and cytological interest, it has received the attention of comparatively few investigators.

Table XV shows percentage of sterile eggs in 34 females.

(9) For details see Table XV.

Table XV

Total number of eggs laid by females of *Microbracon hebetor* Say, number of sterile eggs, number of adult progeny, and their percentage to total number of eggs laid

Serial number	Total number of eggs laid	Number of sterile eggs	Number of adult progeny	Percentage of sterile eggs to total number of eggs laid	Percentage of progeny to total number of eggs laid
1	127	52	27	40.94	21.26
1	91	43	38	47.25	41.75
3	220	98	96	44.54	43.63
4	181	97	63	53.59	34.81
5	138	63	49	45.65	35 51
6	132	59	55	44 70	41.66
7	156	48	36	30.76	23.07
8	120	45	64	37.50	53.33
9	285	126	128(74 females+54 males)	44.21	44 81
10	67	33	22(15 females+ 7 males)	49.25	32.83
11	86	32	37(23 females+14 males)	37.21	42.52
12	159	57	62(39 females+23 males)	35.84	39.99
13	276	89	123	32.29	44.56
14	253	95	118(37 females+81 males)	37.54	46.64
15	97	23	58	23.71	59.79
16	256	114	98	44.53	38.28
17	117	28	67(26 females+41 males)	23.93	53.85
18	124	60	38(22 females+16 males)	48.38	30.64
19	192	89	76	46.87	39.58
20	136	61	52(20 females+32 males)	48.85	38.23
21	296	102	114	34 46	38.52
22	245	115	97(62 females+35 males)	46 93	39.59
23	234	99	101	42.30	43.17
24	93	27	47(25 females+22 males)	29.02	50.53
25	273	106	137	38.09	50.18
26	168	52	91	30.95	53.57
27	134	54	46	40.29	34 32
28	109	46	39(21 females+18 males)	42.20	35.78
29	312	120	111	38.46	35.57
30	362	134	123	37.01	33.99
31	321	126	129	39.25	40.02
32	145	34	86	23 45	59.31
33	245	99	108	40.40	44.08
34	223	96	102	43.41	45.74

Average number of eggs laid by one female = 187 44
Percentage of sterile eggs = 39·354
Percentage of progeny = 41.64

XV. RELATION OF PARASITE LARVA TO HOST

After hatching, the young parasite, finding itself on or very near to the caterpillar which has been rendered helpless by its mother, soon begins feeding and grows rapidly. If about a centimetre from the host or if it has been accidentally moved away from it, the parasite cannot reach its food. If the distance is less than one centimetre the larva may be able to find the host, though in most cases it wanders about helplessly, creeping in all directions; in the end shrivelling and dying. From the time it emerges until it leaves the host for spinning its cocoon, the parasite larva never stops feeding except for three intervals during which it moults.

Fig. 2. — *Microbracon hebetor* Say larvae parasitising *Ephestia* caterpillar.

During the whole feeding period *Microbracon hebetor* Say larva hangs externally to the body of the host (see Fig. 2), held in position by means of the small spines on its body and probably by the integumental secretion which keeps it wet and sticky. It is very easy to pick a larva from the host by means of a small brush, but it is not so easy to do so by means of a thin glass rod with smooth rounded end, and it is really difficult to shake the larva off its host. This gives an idea of the utility of the spines.

The parasite larvae do not move very much during their feeding period, unless they are crowded on their host. They then move, but the distance through which they go is only about four or five millimetres and the movement is accomplished as follows :

The posterior part of the body is fixed to the substratum, the head and anterior part of the body are raised, extended to their fullest length and then fixed to the substratum. The posterior part of the body is now lifted, contracted to its minimum length, and then fixed again to the substratum and so on.

XVI. NUMBER OF HOSTS PARALYSED BY A FEMALE

The number of hosts which a female paralyses differ (1) at different temperature, and (2) with different hosts.

(1) At the temperatures of 20 ± 1° C., 24 ± 1° C. and 32 ± 0.5° C. out of 20 *Ephestia kühniella* Z. larvae, the average number of hosts paralysed by one female in 24 hours was 7, 9.3 and 14. The female *Microbracon* was left at the temperature of the experiment for 12 hours and then introduced into a petri

dish [10] containing 20 full grown *Ephestia* larvae. The dish with its contents was then left in the incubator for 24 hours. Each experiment was repeated twice each time with a different young female; the details of results are shown in Table XVI.

TABLE XVI

Number of hosts paralysed by a female of *Microbracon hebetor* Say at different temperatures

TEMPERATURE IN °C.	NUMBER OF HOSTS PARALISED OUT OF 20 HOSTS SUPPLIED			
	First experiment	Second experiment	Third experiment	Average
20 ± 1..........	7	5	9	7
24 ± 1..........	11	9	8	9.3
32 ± 0.5.......	14	12	16	14

(2) Three females were chosen at random from 50 virgins 5 days old. Each female was introduced into an ordinary insect pill-box 7.62 cms. (3 inches) in diameter and 2.54 cms. (1.0 inch) deep. In one of the pill-boxes were 25 full grown *Ephestia kühniella* Z. larvae, in the 2nd there were 25 full grown *Plodia interpunctella* Hb. larvae and in the third 25 *Galleria mellonella* L. larvae, these three pill-boxes were left at summer room temperature (24-26° C.) for 24 hours and then examined. From the *Ephestia* larvae 14 were paralysed, from the *Plodia* 18 were paralysed and from *Galleria* only 6 were paralysed; the experiment was repeated with another three females and the numbers paralysed were 12, 19, 4 of *Ephestia*, *Plodia* and *Galleria* respectively.

To investigate the utmost number a female may sting, the following experiment was carried out:

Two virgin females chosen at random, from 50 females 3 days' old, were kept in breeding tubes at 26 ± 1° C., and every morning each female was supplied with a host of *Ephestia*, as soon as the host was paralysed, another was supplied. After 4 o'clock in the afternoon no new hosts were given, and the females were left with hosts they have until next morning, so that they release themselves of eggs they may want to lay. One of the females lived 14 days and paralysed 86 hosts, the other lived 18 days and paralysed 93 hosts.

Hase conducted a series of laboratory experiments to ascertain whether under favourable conditions a female *Microbracon* stung all full grown hosts placed with her or whether a certain number escaped the attack. He found

(10) The petri dish was 9.1 cms. in diameter and 1.7 cm. deep.

that as long as the numerical ratios of *Microbracon* to *Ephestia* was 1:1 or 1:2, all caerpillars were paralysed, but when the caterpillars stood higher than the mentioned ratios a certain number escaped destruction.

XVII. NATURAL ENEMIES

No hyperparasites were found on the egg stage of *Microbracon hebetor* Say. In the larval stage, there is a certain amount of cannibalism, and, when the host is badly attacked by bacteria (*Bacillus thuringiensis*), the parasitic larvae are usually infected and soon succumb. The pupal stage is subject to the attacks of the early instars of *Ephestia* and *Plodia* which devour them. In rare cases the full grown *Ephestia* larvae devours the adults which get entangled in the web and cannot effectively use their sting. *Galleria mellonella* L. larvae attack the adults more seriously than *Ephestia* or *Plodia*.

XVIII. SUMMARY

(1) Previous works on *Microbracon hebetor* Say are shortly reviewed.

(2) The habitat of the species is here described as places like mills, warehouses, docks, and seed stores.

(3) Food of larva, of female and of male is described. There is a correlation between food and function in these stages. The larva being the growing stage of the species needs nitrogenous food during all the period of her life. The female needs nitrogenous food only during egg laying period. The male, and female when not laying, do not need any nitrogenous food. The source of this nitrogenous food is certain small caterpillars (*Ephestia*, *Plodia* and *Galleria*) which *Microbracon hebetor* Say parasitises.

(4) Hatching is described. Before eclosion embryo swallows amniotic fluid and air. Gas appears in the trachea before eclosion. Antennae are the organs which pierce the chorion and not mandibles as described by Hase (1922).

(5) Duration of life in mago is described. Females live longer than males. Under room temperature conditions, female lives 51.80 days in summer, 71.98 days in autumn and when she goes through hibernation she lives 144.24 days. Males which mate live 12-14 days, males which do not mate live 14-16 days. There is no difference in longevity of mated and virgin females. Duration of life is compared when insect is (a) starved, (b) given water only, (c) given sugar solution 5 %.

(6) Parthenogenesis is described. It is of the arrhenotokous type, but two isolated instances of deuterotokous are recorded.

(7) Complete life history is described. In England the first generation appears March-May, 4-6 generations follow until late in November when breeding stops and the species hibernates as mated and virgin females.

(8) Influence of temperature on oviposition is described. 15° C. is the lower limit for egg laying, 41° C. is the higher. A correlation between rise in temperature and increase in number of eggs laid is noticed between 18-34° C.

(9) The female is ready to oviposit 14-48 hours after emerging. In room temperature the average number of eggs laid by single female is 187.44, the highest being 362 and the lowest 67. 39.35 % of the eggs are sterile.

(10) Number of hosts paralysed by a female differs at different temperatures and with different hosts.

(11) No hyperparasites were found. Certain amount of cannibalism was noticed. Bacterial infection from hosts affect the larvae. The pupal stages are subject to attacks of the early instars of *Ephestia* and *Galleria* larvae.

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(Faune d'Egypte)

I

Diagnosi di nuovi *Eumenini* mediterranei

(Hymenoptera)

par A. Giordani Soika

(Extrait du *Bolletino della Società Veneziana di Storia Naturale*, Vol. II, N° 1, 1938, pp. 1-13)

Liste des espèces décrites ou citées :

Pseudomicrodynerus felinus nov. spec., ♀. — Egypte : Sakkara, une ♀, 26.III.1933. Le Type fait partie de la collection A. Giordani Soika. Le ♂ est inconnu.

Odynerus (*Leptochilus*) *Flegias* nov. spec., ♀. — Sinai : Tor, une ♀, 26.II.1933. Le Type fait partie de la collection A. Giordani Soika. Mâle inconnu.

Odynerus (*Leptochilus*) *camurus* nov. spec., ♀ et ♂. — Egypte : Abou Rawash (les Types), 10.V.1930, 23.V.1937, 27.VI.1937; Wadi Hoff, 16.V.1937; Le Caire, V.1937 (collections A. Mochi et A. Giordani Soika).

Odynerus (*Leptochilus*) *limbiferoides* nov. spec., ♀ et ♂. — Egypte : Wadi Gerrawi, 8.II.1933, Holotype ♀ (collection A. Giordani Soika); Wadi Hoff, 1897, ♀♀ et ♂♂, parmi lesquels l'Allotype (Schmiedeknecht, Musée de Vienne et collection A. Giordani Soika).

Odynerus (*Leptochilus*) *flexilis* nov. spec., ♀ et ♂. — Egypte : Wadi Hoff, 16 et 17.V.1937, 5 ♀♀ parmi lesquelles l'Holotype; Wadi Digla, 21.IV.1935, Allotype ♂ (collection A. Mochi et A. Giordani Soika); Wadi Galala, 1 ♀, 21-25.III.1935 (collection Ministère de l'Agriculture, Egypte).

Odynerus (*Leptochilus*) *errabundus* nov. spec., ♀ et ♂. — Egypte :

Wadi Hoff, 1 ♂ et 2 ♀♀, parmi lesquels l'Holotype et l'Allotype, 18.X.1936 et 21.II.1937; Wadi Garrawi, 1 ♂, 3.III.1935 (collections A. Mochi et A. Giordani Soika); Borgash, 1 ♂, 31.VII.1932 (collection A. Giordani Soika).

Odynerus (*Leptochilus*) *osiris* Schm.

Odynerus (*Leptochilis*) *Torre-Tassoi* nov. spec., ♂. — Egypte : Le Caire, 1 ♂ (Type), collection A. Giordani Soika. La ♀ n'est pas connue.

Odynerus (*Leptochilus*) *Schindleri* Guiglia. — Egypte : Ikingi Mariout, 1 ♂ et 2 ♀♀, 16-17.III.1935; Abusir, 2 ♀♀ et 1 ♂, 17.IV.1935; Dekhela, 1 ♂, 19.III.1935 (collections A. Mochi et A. Giordani Soika).

Odynerus (*Leptochilis*) *Schatzmayri* nov. spec. — Sinai : Tor, 1 ♀ (Type), 25.II.1933 (collection A. Giordani Soika). La femelle n'est pas connue.

Odynerus (*Leptochilus*) *Falkenhayni* Dusm. — Egypte : Gebel Asfar, 21.III.1935; environs du Caire, 20-30.V.1937 (collection A. Mochi).

Odynerus (*Leptochilus*) *Falkenhayni* Dusm. var. — Egypte : même localités que la forme typique.

II

Sur une nouvelle Sous-Famille et deux nouveaux Genres de Tétranyques

(Acarina)

par le Dr. M. Taher Sayed

(Extrait du *Bulletin du Muséum National d'Histoire Naturelle*, Paris, 2e Série, Tome X, N° 6, 1938, pp. 601-610)

Sont décrits, dans ce travail, la sous-famille Pseudotetranychidae, le genre *Phyllotetranychus*, établi pour la nouvelle espèce *aegyptium* [lire *aegyptiacus*], le genre *Dolichotetranychus* pour l'espèce américaine *floridanus* Banks erronément attribuée par Banks au genre *Stygmaeus*.

Phyllotetranychus aegyptiacus Sayed infeste la face dorsale des feuilles du Dattier (variété Siwah) à Mataanah (Haute Egypte); *Dolichotetranychus floridanus* Banks a été observé sur *Cynodon dactyclon* L., *Phragmites communis* et *Ananas sativus* Lindl.

Ce travail comporte de nombreuses illustrations.

III

Ueber die Verbreitung und Formenbildung der Gattung *Stilbum* Spin.

(Hymenoptera : Chrysididae)

von Dr. Stephan Zimmermann, Wien

(Extrait des *Archiv für Naturgeschichte*, N.F., Bd. 6, heft 4, 1937, pp. 645-662)

Ce travail définit les diverses formes de *Stilbum*, cite d'Egypte le *Stilbum cyanurum cyanurum* Forst. et le *Stilbum cyanurum splendidum* F., et donne une nomenclature des Hyménoptères (Sphegides, Vespides et Apides) aux dépens desquels les *Stilbum* vivent.

IV

A remarkable new ant-like Lygaeid from Egypt

(Hemiptera-Heteroptera)

by W. E. China, M.A.

(Extrait de *The Proceedings of the Royal Entomological Society of London*, Series B [Taxonomy], Vol. 5, part 8, 1936, pp. 164-167).

Dans cet article est décrite une nouveauté de la sous-famille des *Rhyparochrominae* (tribu des Myodochini) : *Aegyptocoris* gen. nov. *myrmecoides* spec. nov.

Habitat : Kafr Hakim (3 ♀♀ brachyptères, y compris le type), 13.XII.1933 ; Kafr Hakim (2 ♀♀ brachyptères), 14.II.1934 ; Magadlah (1 ♀ macroptère), Novembre 1934. — Vit sous une graminée (*Imperata cylindrica* (L.) P.B.), communément nommée Halfa.

La description est accompagnée de figures.

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DE LA

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DU

VINGT-QUATRIÈME VOLUME

1940

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